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800 COMMUNICATION SYSTEM

RT-131A/831A
TEST-CORD -

SERVICE PARTS MANUAL

Signed _____ for
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800

COMMUNICATION SYSTEM

TYPE 831A

SERVICE/PARTS MANUAL

This manual contains factory recommended procedures for servicing and maintaining the Cessna 800 Communication System, Type 831A. This manual is divided into seven sections to assist in the overhaul and replacement of parts on each respective Cessna 800 Communication System component.

This information is supplemented and kept current by Service Letters and Service News Letters published by the Cessna Aircraft Company. Recommended replacement parts, for this system are available from the Cessna Dealers' Organization.

This manual supersedes D4503-13, dated December 1974.

CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS
MAY 1974

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CONTENTS

CONTENTS - Continued

ILLUSTRATIONS

SECTION 1 - GENERAL INFORMATION

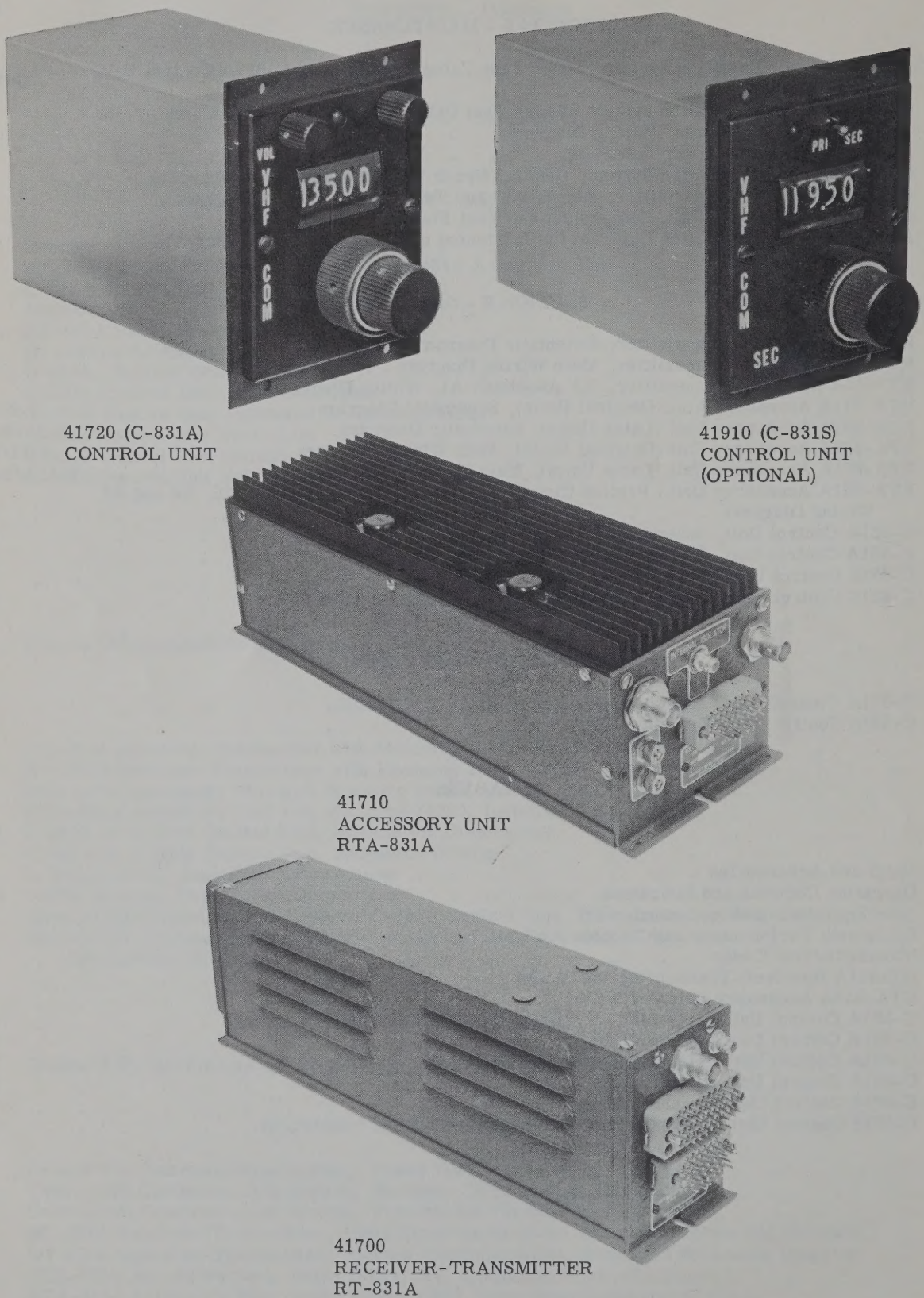
SECTION 2 - INSTALLATION

SECTION 3- OPERATION

SECTION 4 - PRINCIPLES OF OPERATION

ILLUSTRATIONS - Continued

TABLES



41720 (C-831A)
CONTROL UNIT

41910 (C-831S)
CONTROL UNIT
(OPTIONAL)

41710
ACCESSORY UNIT
RTA-831A

41700
RECEIVER-TRANSMITTER
RT-831A

Figure 1-1. Cessna 800 Communication System

FCC LICENSING DATA

Application for an aircraft radio station license for the RT-831A Receiver-Transmitter of the 831A Communication Set must be made on FCC Form 404. In response to Question 14, insert:

Manufacturer	Cessna Type No.
Aircraft Radio Corporation Boonton, New Jersey, U. S. A.	RT-831A

SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION.

This instruction book contains installation, operation, maintenance, and parts information for the Cessna 800 Communication System. The units of the Cessna 800 Communication System are shown in Figure 1-1.

1-2. PURPOSE.

The Cessna 800 Communication System is a solid-state, remotely controlled, communication set capable of receiving and transmitting voice communications on any of 720 channels between 118.000 and 135.975 MHz. The 720 channels are synthesizer controlled and are spaced 25 kHz apart.

1-3. SPECIFICATIONS.

General Characteristics.

Frequency Range:	118.000-135.975 MHz
Number of Channels:	720
Channel Spacing:	25 kHz
Frequency Stability:	±.002%
Input Power Requirement:	Receive: 1.5 amperes at 27.5 volts dc Transmit: 6.5 amperes at 27.5 volts dc
Weights and Dimensions:	See Figures 2-1 through 2-5

Certification:

RT-831A:	TSO-C37b Class I, Env. Cat. $^{A}_{D}A^{A}_{B}AAAE$
	TSO-C38b Env. Cat. $^{A}_{D}A^{A}_{B}AAAE$
RTA-831A:	TSO-C37b Class I, Env. Cat. $^{A}_{D}A^{A}_{B}AAAE$
	TSO-C38b Env. Cat. $^{A}_{D}A^{A}_{B}AAAE$
C-831A and C-831S:	TSO-C37b Class I, Env. Cat. $^{A}_{D}AAAAAE$
	TSO-C38b Env. Cat. $^{A}_{D}AAAAAE$
Mounting 36450:	TSO Env. Cat. $^{A}_{D}AB$---
Mounting 34980:	TSO Env. Cat. $^{A}_{D}AB$---
Mounting 36280:	TSO Env. Cat. $^{A}_{D}AA$---
Mounting 36320:	TSO Env. Cat. $^{A}_{D}AA$---

Receiver.	
Circuit:	Double-conversion superheterodyne
Sensitivity:	2.0 μV or less for 6 dB S+N/N ratio
Image Rejection:	At least 70 dB down
Selectivity:*	Total bandwidth at 6 dB: 36 kHz Total bandwidth at 60 dB: 66 kHz
Headset Audio:	5.0 volts across 250 ohms at 1000 Hz, 30% modulation
Audio Response:	350 to 2500 Hz, 6 dB bandwidth
Squelch Sensitivity:	Adjustable from 0 to 15 μV
Transmitter.	
Power Output:	20 watts, nominal
Modulation Capability:	85% minimum
Rated Duty Cycle:	1 minute on, 4 minutes off
Speaker Amplifier.	
Output:	Rated at 10 watts into 4-ohm load
Audio Channels:	9

*When ground station frequency tolerances are compatible with 25-kHz channel spacing, the crystal filter may be replaced to provide the following selectivity: total bandwidth at 6 dB, 22 kHz; at 60 dB, 34 kHz.

1-4. UNITS AND ACCESSORIES.

Table 1-1 lists the units and accessories available for an 831A installation. For model differences, see paragraph 1-7.

1-5. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

Interconnecting cable assemblies are not supplied but must be fabricated from individual wires and RG-58/U coaxial cable (not supplied) and the connector kits listed in Table 1-1. The wire sizes required to fabricate the interconnecting cables are specified in Figures 2-9 and 2-10. The actual lengths of the wires and cables will depend on the location of the equipment in the aircraft.

A VHF communication antenna is required for use with the Cessna 800 Communication System. The A-25D or the A29C Antenna is recommended, but any comparable antenna may be substituted.

1-6. DESCRIPTION OF UNITS.

Receiver-Transmitter. The RT-831A Receiver-Transmitter is a solid-state unit which includes all the receiver circuits and the exciter portion of the transmitter. The receiver-transmitter covers the VHF communication frequencies between 118.000 and 135.975 MHz. A frequency synthesizer is used to provide 720 channels spaced .025 MHz (25 kHz) apart. The frequency synthesizer uses solid-state logic, digital, and linear circuits to produce the selected transmitter RF frequency and the corresponding receiver local oscillator signal. Seven microcircuit networks are used in the IF and audio circuits of the receiver. The receiver includes a squelch circuit which can be manually adjusted to the desired noise threshold. The receiver also provides an aural output for headset operation and includes circuits for connecting up to nine audio inputs through the RTA-831A Accessory Unit for speaker amplification.

The receiver-transmitter is base-mounted in any convenient location. All electrical connections to the receiver-transmitter are made through four connectors on the front of the unit.

Accessory Unit. The RTA-831A Accessory Unit is an all-transistorized unit which includes all of the transmitter circuits except the exciter. It also includes a modulator-amplifier circuit which functions as a modulator during transmit condition and as a speaker amplifier during receive condition. Regulator circuits provide regulated voltages for the receiver and the transmitter, and a transient-protector switch circuit protects most of the circuits of the set from transient voltages on the primary input line.

A coaxial relay in the accessory unit permits the use of a common antenna for reception and transmission. In earlier production units, a delay circuit prevents the application of an RF signal to the transmitter until the antenna has been switched to the transmitter circuits. Later units do not include the delay circuit.

The accessory unit is base-mounted in any convenient location. Electrical connections are made through four connectors on the front of the unit.

Control Units. The C-831A Control Unit provides remote control of the Cessna 800 Communication system. All controls and indicators are located on the front panel. An on-off rotary switch ganged with a potentiometer controls power to the set and the audio output (volume) of the receiver. Two concentric fre-

TABLE 1-1. UNITS AND ACCESSORIES

Quantity	Name	Type No.	Part No.
1	Receiver-Transmitter	RT-831A	41700
1	Accessory Unit	RTA-831A	41710
1	Control Unit	C-831A	41720-0000
1	Control Unit[1]	C-831S	41910-0000
1	Mounting, Rigid (for RT-831A)[2]	--	36450
1	Mounting, Vibration-isolated (for RT-831A)[2]	--	36280
1	Mounting, Rigid (for RTA-831A)[2]	--	34980
1	Mounting, Vibration-isolated (for RTA-831A)[2]	--	36320
1	Antenna[1]	A-25D[2]	37670
		A-29C[2]	35180-0000[3]
		A-29C[2]	35180-0200[3]
2	Connector Kit, consisting of:	--	37546-0013
1	Connector	--	35860-0034
33	Contact, Crimp-type	--	35861-4020
1	Polarizing Plug	--	35861-0002
1	Guide Pin	--	35862-0002
1	Guide Socket	--	35862-0001
1	Lever and Pivot Set	--	29916-0002
1	Shell	--	36048-0034
1	Connector Kit[1], consisting of:	--	37546-0011
1	Connector	--	35860-0034
20	Contact, Crimp-type	--	35861-4016
13	Contact, Crimp-type	--	35861-4020
1	Polarizing Plug	--	35861-0002
1	Guide Pin	--	35862-0002
1	Guide Socket	--	35862-0001
1	Lever and Pivot Set	--	29916-0002
1	Shell	--	36048-0034
2	Connector Kit, consisting of:	--	37546-0012
1	Connector	--	35860-0026
4	Contact, Crimp-type	--	35861-4016
21	Contact, Crimp-type	--	35861-4020
1	Polarizing Plug	--	35861-0002
1	Guide Pin	--	35862-0002
1	Guide Socket	--	35862-0001
1	Lever and Pivot Set	--	29916-0002
1	Shell	--	36048-0026
2	TNC Connector, Solder-type[2]	--	28776
2	TNC Connector, Crimp-type[2]	--	36608
2	MB Connector, Solder-type[2]	--	36798
*	BNC Connector, Solder-type[2]	--	11337
*	BNC Connector, Crimp-type[2]	--	36607

1 Optional
2 Alternative items; supplied as specified.
3 Part No. 35180-0000, has centered connector. Part No. 35180-0200, has off-center connector.
* One BNC Connector, either solder- or crimp-type, is supplied. An additional BNC Connector, for use with the antenna, is optional.

quency controls select the operating frequency, which is displayed digitally. When transmitting on the selected frequency, a front-panel lamp glows. A variable squelch control is provided to reduce the audio noise of the receiver output during the absence of a received signal. The plastic front panel of the control unit is edge-lighted by six subminiature lamps. All electrical connections are made through a connector on the rear of the unit.

The optional C-831S Control Unit, when used with the C-831A Control Unit, provides control for selecting a secondary operating frequency. Except for the on-off/volume and squelch controls of the C-831A, which are not included in the C-831S, the frequency selector controls, readout indicator, front-panel edge lighting, and electrical connector are identical to those on the C-831A. In addition, a toggle switch on the front panel is used to switch the communication set to either the primary (C-831A) or secondary (C-831S) operating frequency. When the toggle switch is in the secondary (SEC) position, the C-831S indicator lamp glows during transmit operation.

Mountings. Either Mounting 36450, a rigid mounting, or Mounting 36280, a vibration-isolated mounting, is used to secure the receiver-transmitter to the airframe. The accessory unit requires either Mounting 34980, a rigid mounting, or Mounting 36320, a vibration-isolated mounting. The units are secured by a nut-and-clamp arrangement on the front of the mountings. Flexible metal straps on the bottom of the 36280 and 36320 Mountings are used to bond the unit and the mounting to the airframe.

1-7. MODEL DIFFERENCES.

As referenced in this manual, "original" or "earlier" production units of the RTA-831A Accessory Unit may be identified by the INTERNAL ISOLATOR identification plate, located at A8J3, the "xmtr drive in" connector on the front of the unit. "Later" production units, in which internal isolator A8Z1, and A4, the relay delay assembly, were omitted, can be identified by the absence of the identification plate.

Also, beginning with Serial No. 225 of the RT-831A Receiver-Transmitter, Synthesizer Assembly A4 was modified to include wide-temperature range IC's and related design changes.

SECTION 2

INSTALLATION

2-1. UNPACKING.

Remove all packing material from the packing case and carefully remove the units. Inspect each unit for damage. Check the units and accessories against the packing slip to be sure all items have been received and removed from the packing case.

2-2. CABLE FABRICATION.

The cable assemblies required to interconnect the units of the Cessna 800 Communication System are made from individual wires and coaxial cable (not supplied) and connector kits which are supplied. The actual lengths of the wires and cable will depend on the location of the equipment in the aircraft.

Interconnecting diagrams are shown in Figure 2-9 and Figure 2-10. As shown in Figure 2-9, when only the C-831A Control Unit is installed, two connector kits, Part No. 37546-0013, are used for interconnecting the control unit and the receiver-transmitter. When both the C-831A and the C-831S Control Unit are to be installed, an additional connector kit, Part No. 37546-0011, is required. As shown in Figure 2-10, this additional connector kit is used for the C-831A in place of Connector Kit 37546-0013, which is then used for the C-831S. The inner diameter of 20 of the contacts included in Connector Kit 37546-0011 are larger to accommodate the additional wires required for interconnecting the C-831A and C-831S.

2-3. PREINSTALLATION TESTS.

Before installation, the communication set should be bench-tested for overall performance. Interconnect the units as shown in Figure 2-9 or 2-10, and proceed as follows:

Note

Equivalent test equipment may be substituted for any specified.

Step 1. Connect a Hewlett-Packard Model 608D Signal Generator through a Hewlett-Packard Model 00505B Attenuator to antenna connector J4 of the accessory unit. Set 608D for output of 2μV at 126.00 MHz, with 30% modulation of 1 kHz.

Step 2. Connect Ballantine Model 300D VTVM to "phone out" (terminal P, J2) of the receiver-transmitter.

Step 3. Apply power to the communication set.

Step 4. Select 126.00 MHz on control unit.

Note

If both C-831A and C-831S are included in bench test, check that PRI-SEC switch is set to required position: PRI for C-831A, SEC for C-831S.

Step 5. Adjust volume control for approximately 3.2 volts (10 dB) indication on 300D.

Step 6. Remove modulation from 608D. Model 300D should indicate a drop of at least 6 dB.

Step 7. Reconnect 300D across speaker.

Step 8. Readjust 608D for 10μV signal with 30% modulation of 1 kHz. Model 300 D should indicate at least 5 volts ac.

Step 9. Disconnect 608D, 00505B, and 300D.

Step 10. Connect a Bird Electronic Model 61 Wattmeter through a linear detector to antenna connector J4 of the accessory unit. Connect a Tektronix Model 310A Oscilloscope to side port of linear detector. Connect a Hewlett-Packard Model 200AB Audio Oscillator to "mike audio" input (terminal A, A8J1) of accessory unit.

Step 11. Adjust 200AB for output of 1000 Hz at 1 volt.

Step 12. Select 118.000, 126.500, and 135.975 MHz, and key transmitter at each selected position. Lamp on control unit in use should glow as transmitter is keyed. Model 61 should indicate a minimum of 16 watts and 310A should indicate at least 85% modulation for each frequency selected.

Step 13. Increase output of 200AB to 2.5 volts, and recheck transmitter output at 118.000, 126.500, and 135.975 MHz. Model 61 should indicate a minimum of 16 watts and 310A should indicate more than 85% but less than 100% modulation for each frequency selected.

Step 14. Disconnect 61, 310A and 200AB.

2-4. INSTALLATION REQUIREMENTS.

The location and installation of the communication set may vary with each aircraft; however, the following general requirements are applicable to all aircraft.

a. Check that the proposed installation areas can accommodate the units. Refer to the installation dimensions in Figure 2-1 through 2-8.

b. Install the units in an area where they will be accessible for inspection and maintenance but not subject to excessive heat, vibration, or noise generating sources. Install the control unit in an area convenient to the operator.

c. Allow at least 3 inches at the front of the receiver-transmitter and the accessory unit and 4 inches at the rear of the control unit to accommodate the electrical cables. Make no sharp bends in the wiring. Do not run cables where they may be subjected to chafing or excessively high temperatures.

d. To ensure proper antenna grounding, use internal- or external-tooth lockwashers under the head of each mounting screw and tighten screws securely, particularly if a weather seal is used.

2-5. INSTALLATION OF RECEIVER-TRANSMITTER AND MOUNTING.

Installation dimensions for the receiver-transmitter installed on its mounting are shown in Figure 2-1 and 2-2. To install the receiver-transmitter and mounting, see Figure 2-1 or 2-2, as applicable, and proceed as follows:

Step 1. Use bottom plate of mounting as a template to locate mounting holes.

Step 2. Drill required number and size of holes in mounting surface. Remove paint and clean the surface around holes to ensure proper bonding.

Step 3. Secure mounting with binding head screws, lockwashers, and nuts.

Step 4. Place receiver-transmitter on mounting. Position clamp and tighten knurled nut to secure unit in position.

2-6. INSTALLATION OF ACCESSORY UNIT AND MOUNTING.

Installation dimensions for the accessory unit installed on its mounting are shown in Figure 2-3 and 2-4. To install the accessory unit and mounting, see Figure 2-3 or 2-4, as applicable, and proceed as follows:

Step 1. Use bottom plate of mounting as a template to locate mounting holes.

Step 2. Drill required number and size of holes in mounting surface. Remove paint and clean the surface around holes to ensure proper bonding.

Step 3. Secure mounting with binding head screws, lockwashers, and nuts.

Step 4. Place accessory unit on mounting. Position clamp and tighten knurled nut to secure unit in position.

2-7. INSTALLATION OF CONTROL UNITS.

The C-831A and C-831S Control Units are designed for mounting on a 1/16-inch-thick panel. Panels of other thicknesses require the use of the adapter plate supplied with the unit. Control unit installation dimensions are shown in Figure 2-5. Assembly details, with and without the adapter plate, are shown in Figure 2-6.

2-8. INSTALLATION OF ANTENNA.

Installation dimensions for the A-25D Antenna are shown in Figure 2-7. Installation dimensions for the A-29C Antenna are shown in Figure 2-8. In general, keep the antenna symmetrical with the centerline of the aircraft and install it as far as possible from other antennas, lead-in wires, and guy wires.

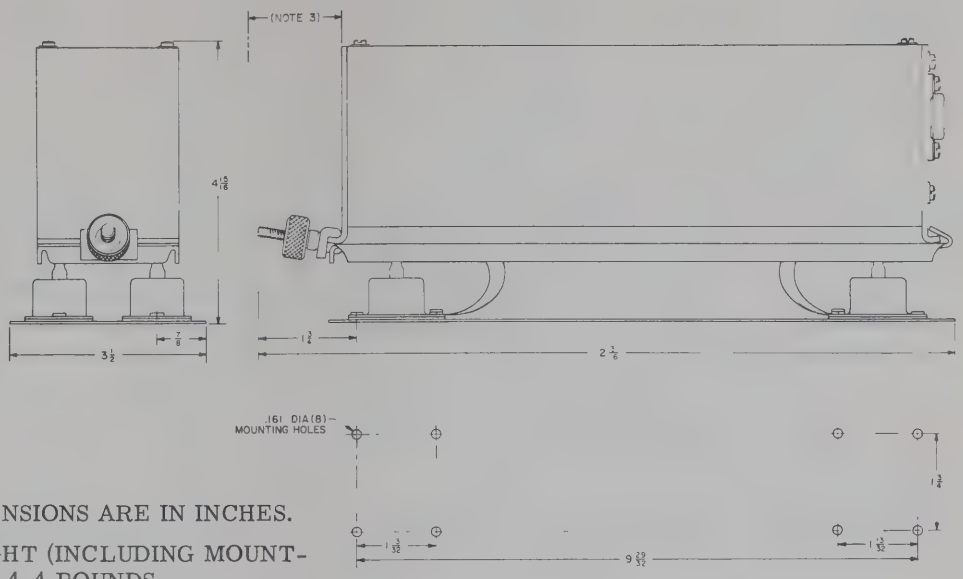
2-9. INTERCONNECTION OF UNITS.

An interconnection diagram for a Cessna 800 Communication system installation with only a C-831A Control Unit is shown in Figure 2-9. If both a C-831A Control Unit and a C-831S Control Unit are installed, interconnect the units as shown in Figure 2-10. Terminate cables and wiring as shown.

2-10. POSTINSTALLATION CHECKS AND ADJUSTMENTS.

No postinstallation adjustments of the communication set are required, but a postinstallation check should be performed to verify its operation. Refer to the operating procedures in Section 3 and check the equipment by communicating with the base station or local communication facility on several channels.

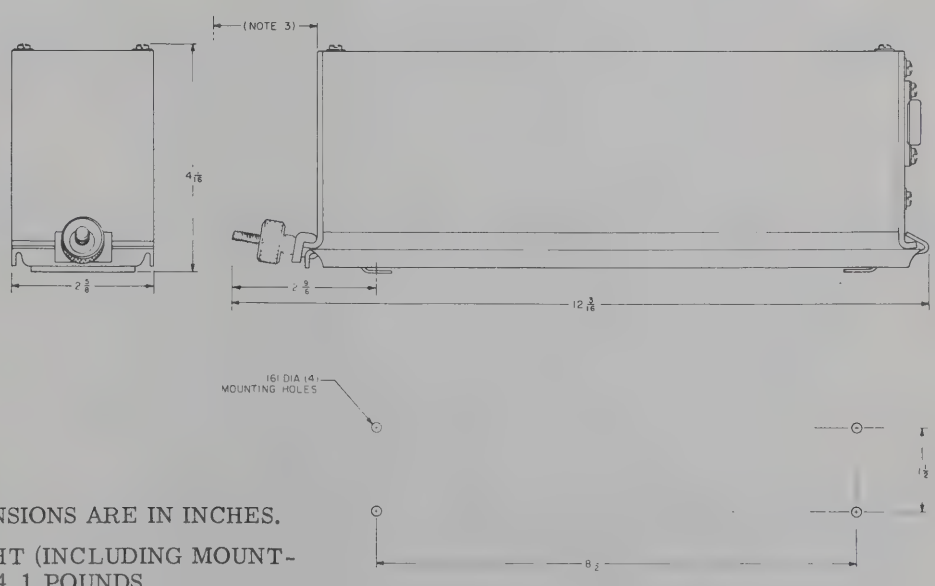
The amplifier level control, A8R6, and the speaker and phone sidetone level controls, A8R3 and A8R5, are preset at the factory for an average output. After the postinstallation check has been performed, these controls may be reset if desired. See Figure 5-6 for the location of these controls.



NOTES:

1. DIMENSIONS ARE IN INCHES.
2. WEIGHT (INCLUDING MOUNTING): 4. 4 POUNDS.
3. ALLOW 3 INCHES FOR PLUG REMOVAL.

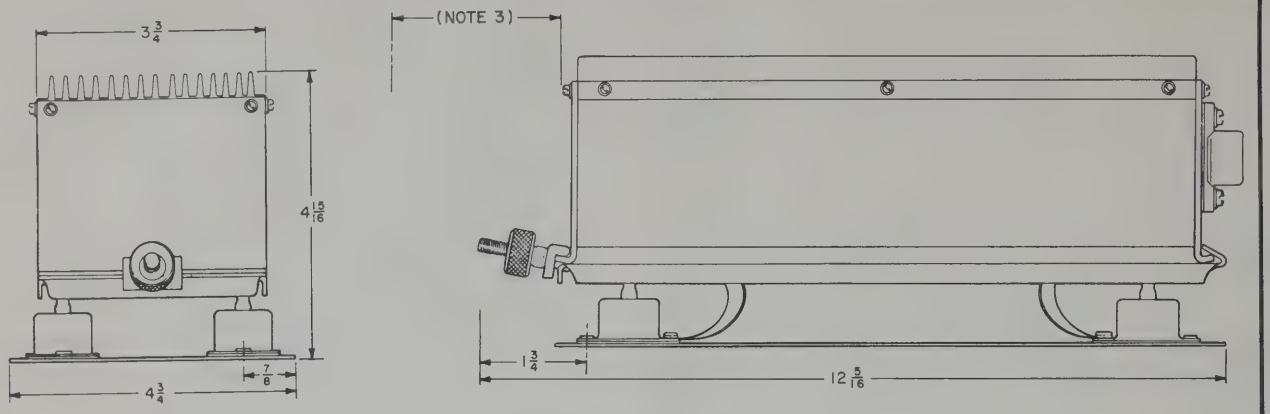
Figure 2-1. RT-831A Receiver-Transmitter with Mounting 36280, Installation Dimensions

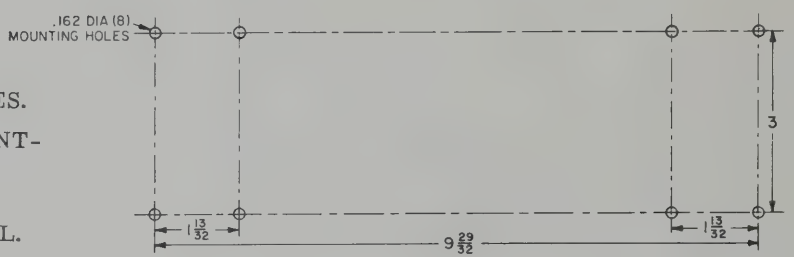


NOTES:

1. DIMENSIONS ARE IN INCHES.
2. WEIGHT (INCLUDING MOUNTING): 4. 1 POUNDS.
3. ALLOW 3 INCHES FOR PLUG REMOVAL.

Figure 2-2. RT-831A Receiver-Transmitter with Mounting 36450, Installation Dimensions

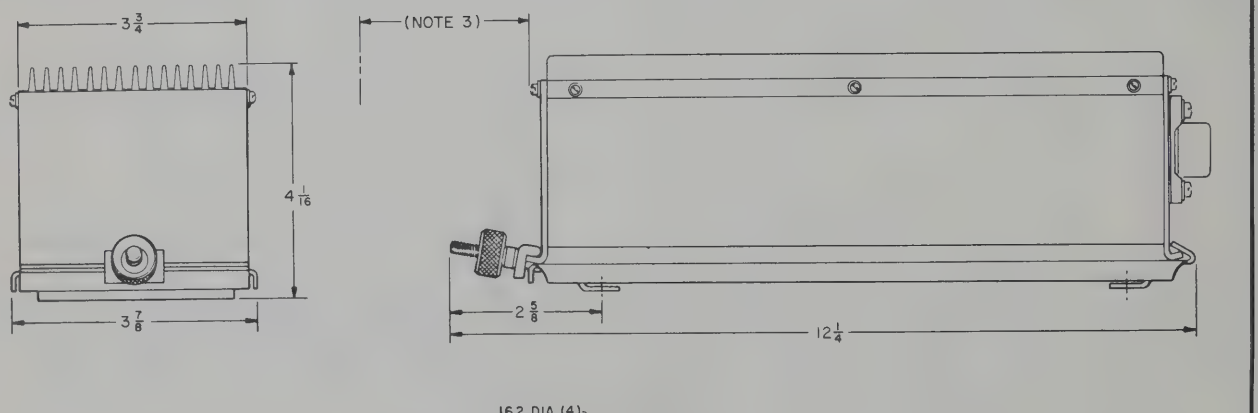


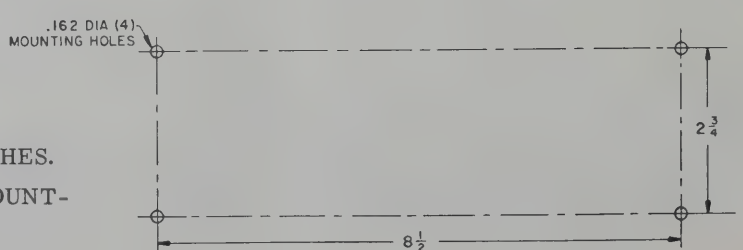


NOTES:

1. DIMENSIONS ARE IN INCHES.
2. WEIGHT (INCLUDING MOUNTING): 6.2 POUNDS.
3. ALLOW 3-1/2 INCHES FOR PLUG AND PLUG REMOVAL.

Figure 2-3. RTA-831A Accessory Unit with Mounting 36320, Installation Dimensions

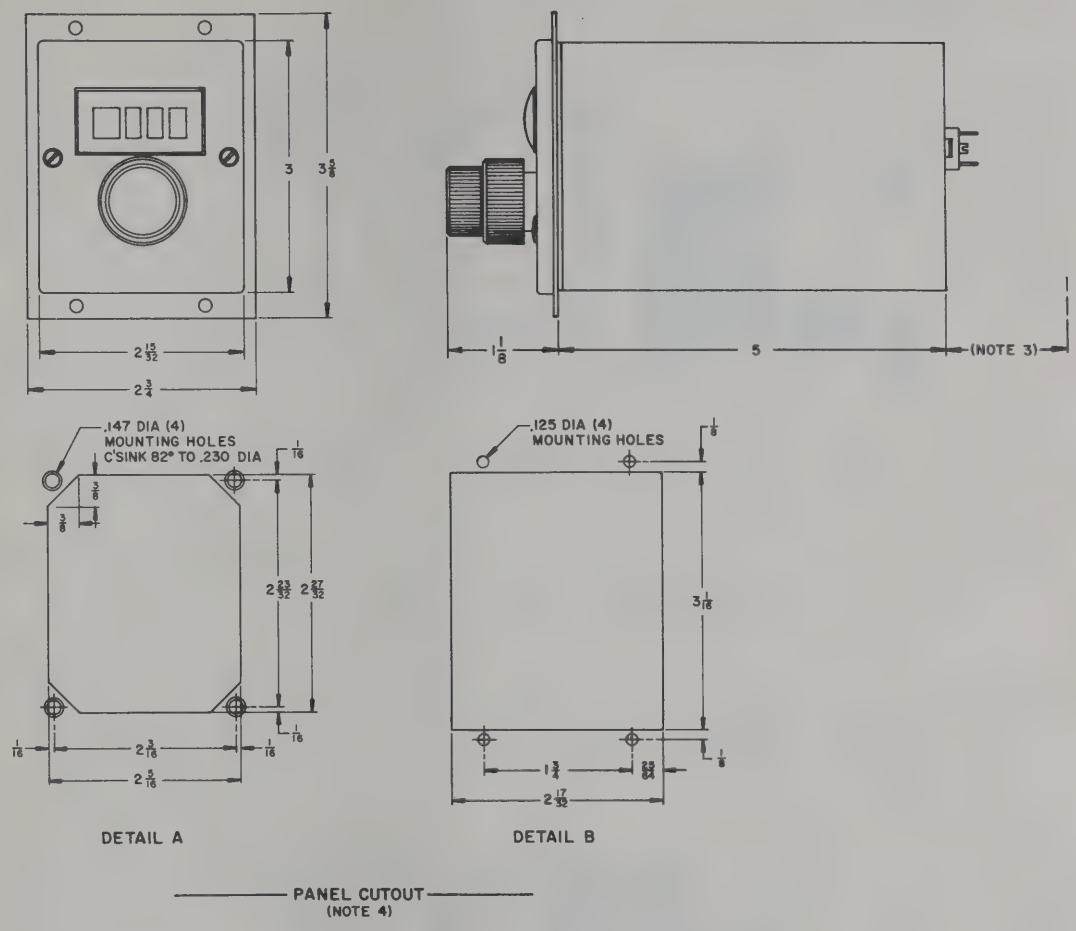




NOTES:

1. DIMENSIONS ARE IN INCHES.
2. WEIGHT (INCLUDING MOUNTING): 5.9 POUNDS.
3. ALLOW 3-1/2 INCHES FOR PLUG AND PLUG REMOVAL.

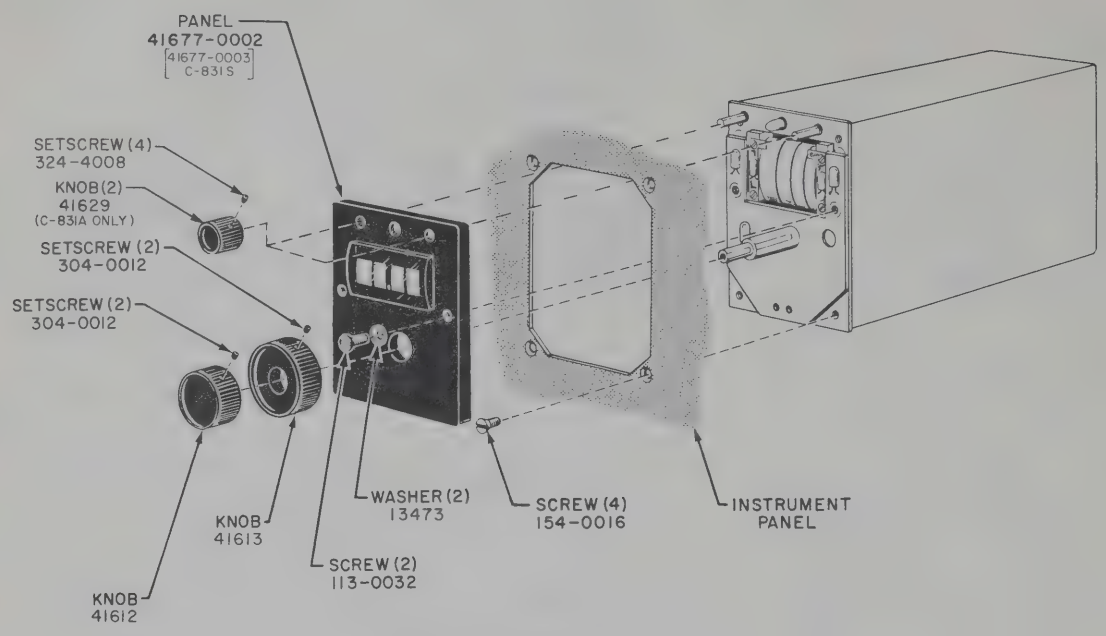
Figure 2-4. RTA-831A Accessory Unit with Mounting 34980, Installation Dimensions



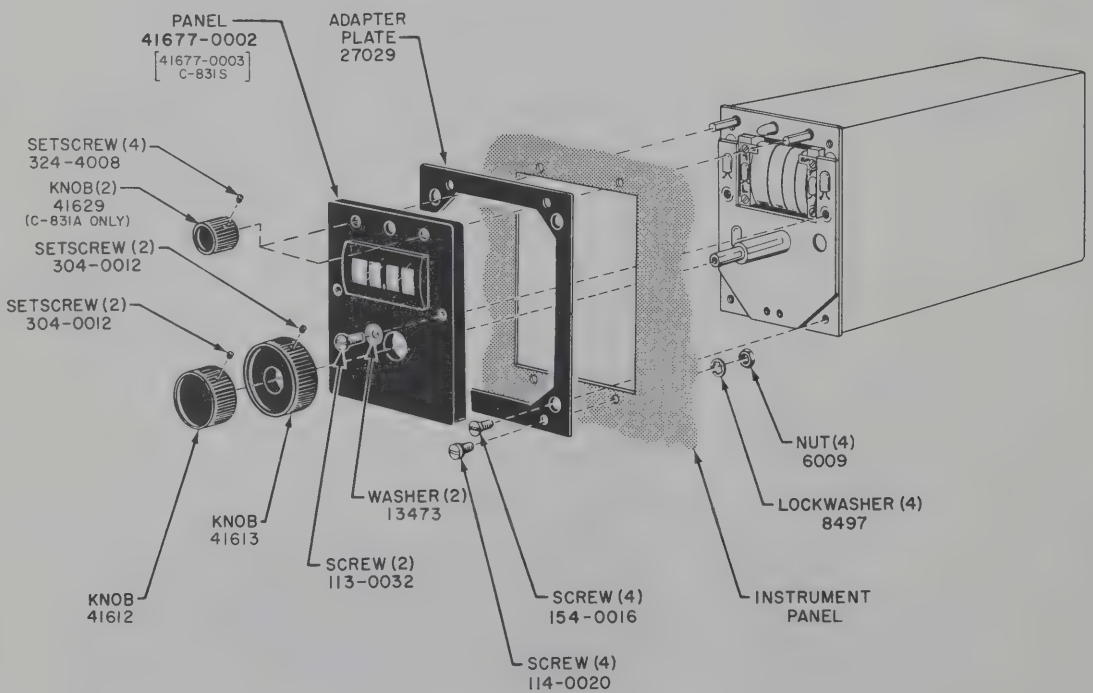
NOTES:

1. DIMENSIONS ARE IN INCHES.
2. WEIGHT: 1.4 POUNDS.
3. ALLOW 4 INCHES FOR CABLE BEND.
4. C-831A or C-831S MOUNTS DIRECTLY ON 1/16 INCH INSTRUMENT PANEL. UNIT REQUIRES ADAPTER PLATE IF PANEL IS OF ANY OTHER THICKNESS. USE CUTOUT DIMENSIONS, DETAIL A, FOR DIRECT PANEL MOUNTING. USE CUTOUT DIMENSIONS, DETAIL B, FOR MOUNTING UNIT WITH ADAPTER PLATE.

Figure 2-5. C-831A or C-831S Control Unit, Installation Dimensions



A. WITHOUT ADAPTER PLATE



B. WITH ADAPTER PLATE

Figure 2-6. C-831 or C-831S Control Unit, Assembly Details

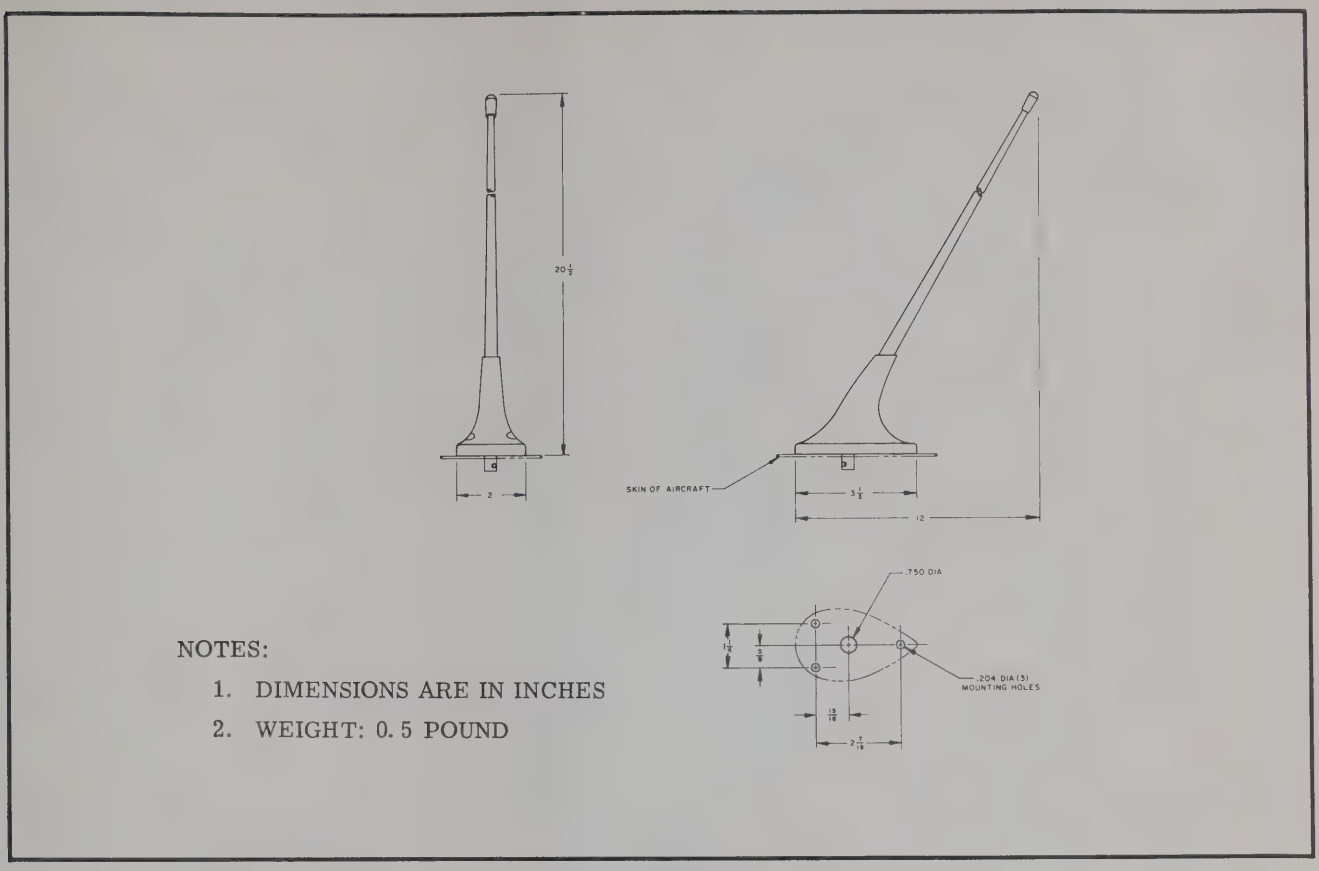


Figure 2-7. A-25D Antenna, Installation Dimensions

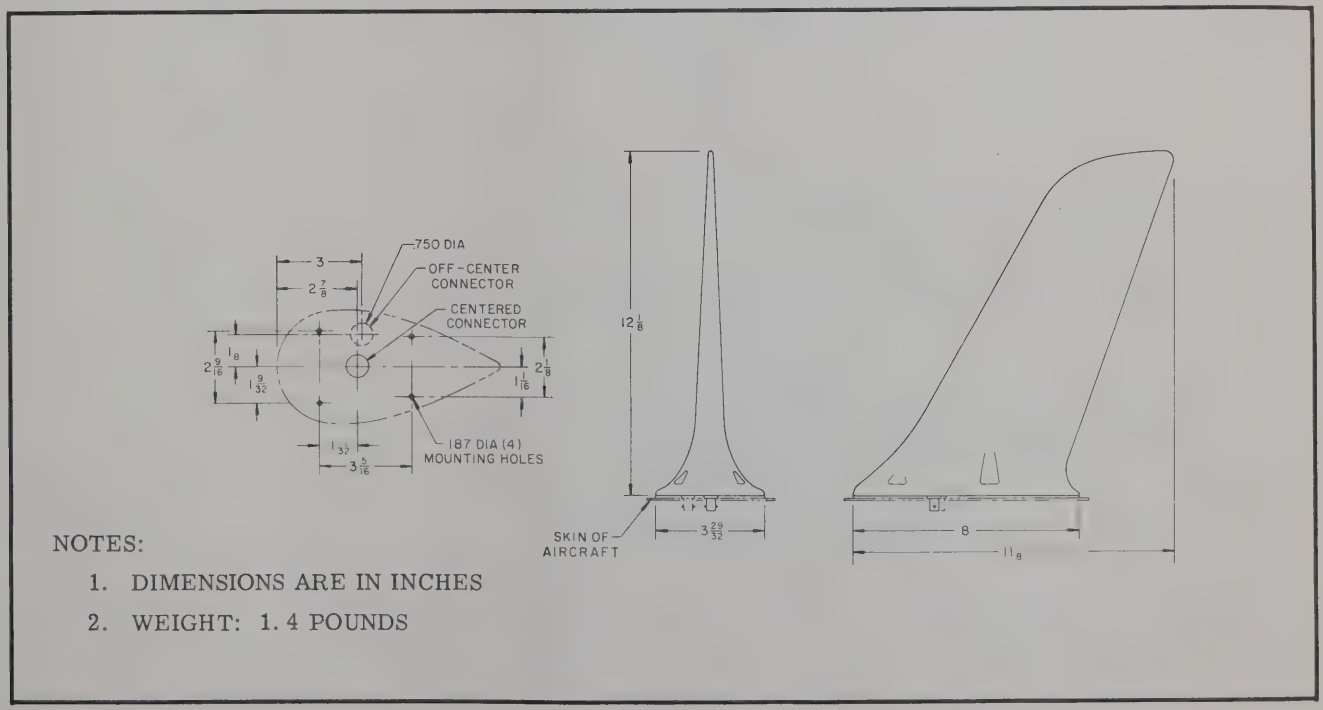
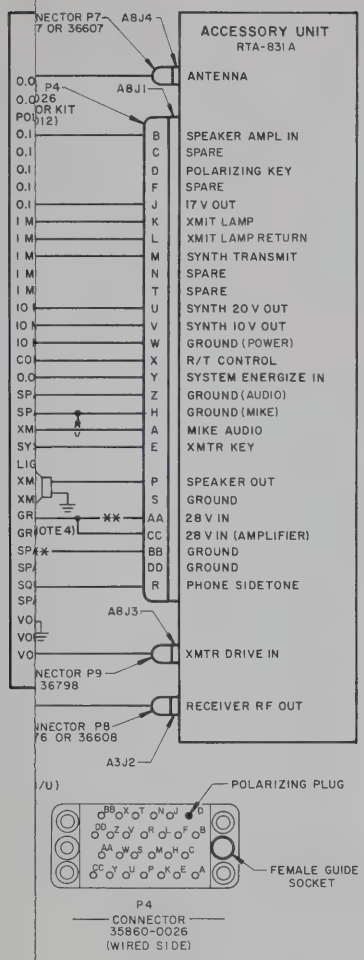


Figure 2-8. A-29C Antenna, Installation Dimensions



faces to which all mountings are attached must be clean,

marked wires are No. 22 AWG. Wires marked with an
es marked with a double asterisk (**) are No. 16 AWG.
h insulating jacket.

ampere circuit breaker.

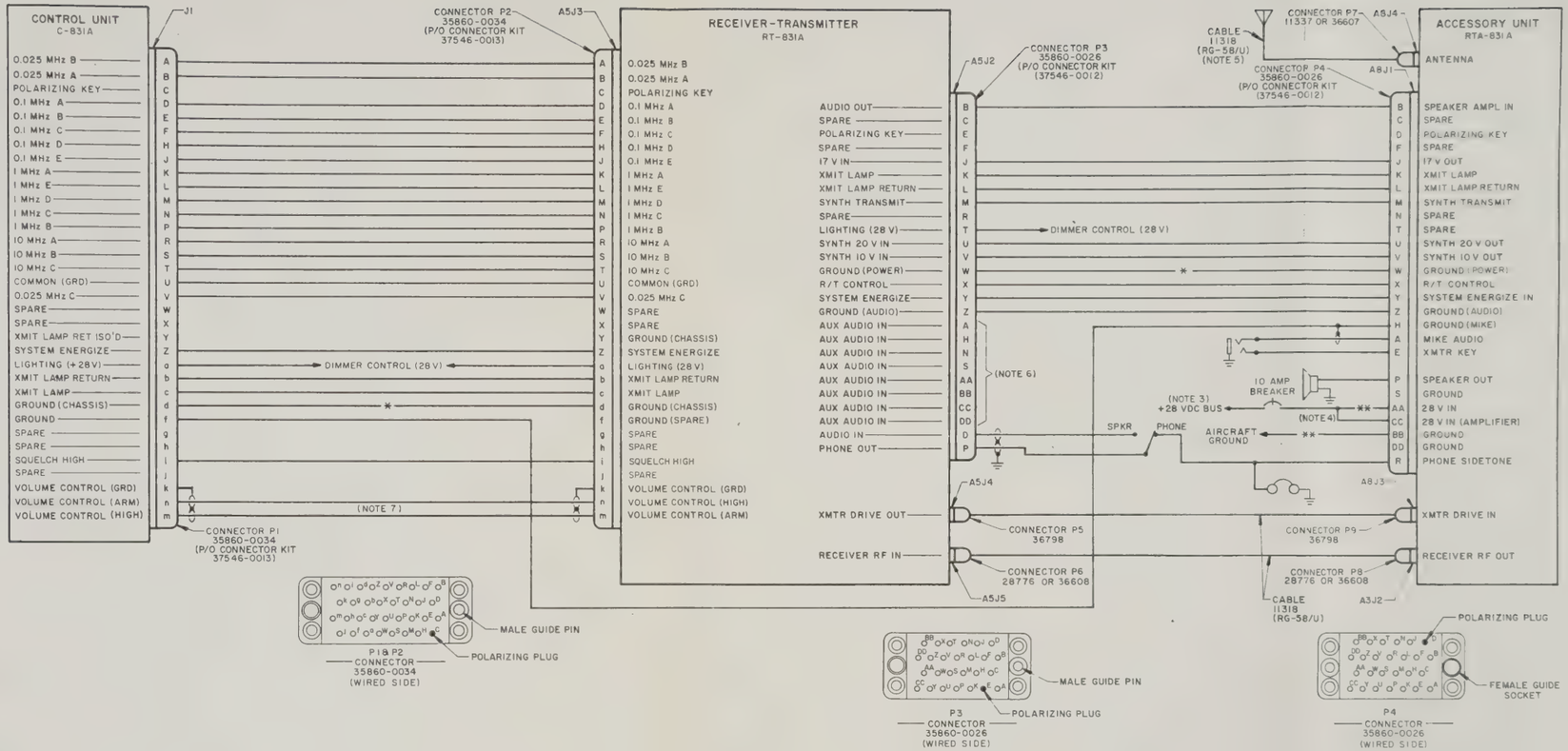
rough C-831A on-off switch, connect jumper between
lent control of amplifier, delete jumper and connect CC
circuit breaker.

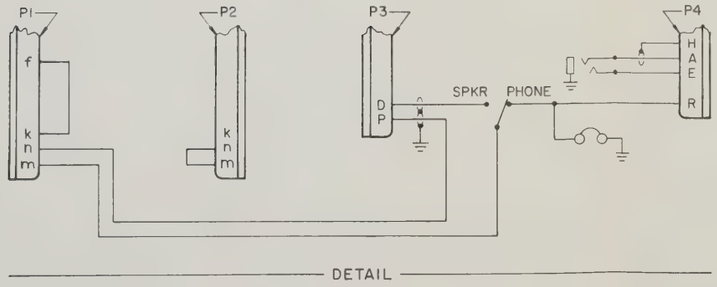
inches, or any multiple of 31 inches.

may be connected through individual SPDT switches to
put.

e level, use alternate method of volume control wiring,

a 800 Communication System, C-831A
nit, Interconnection Diagram

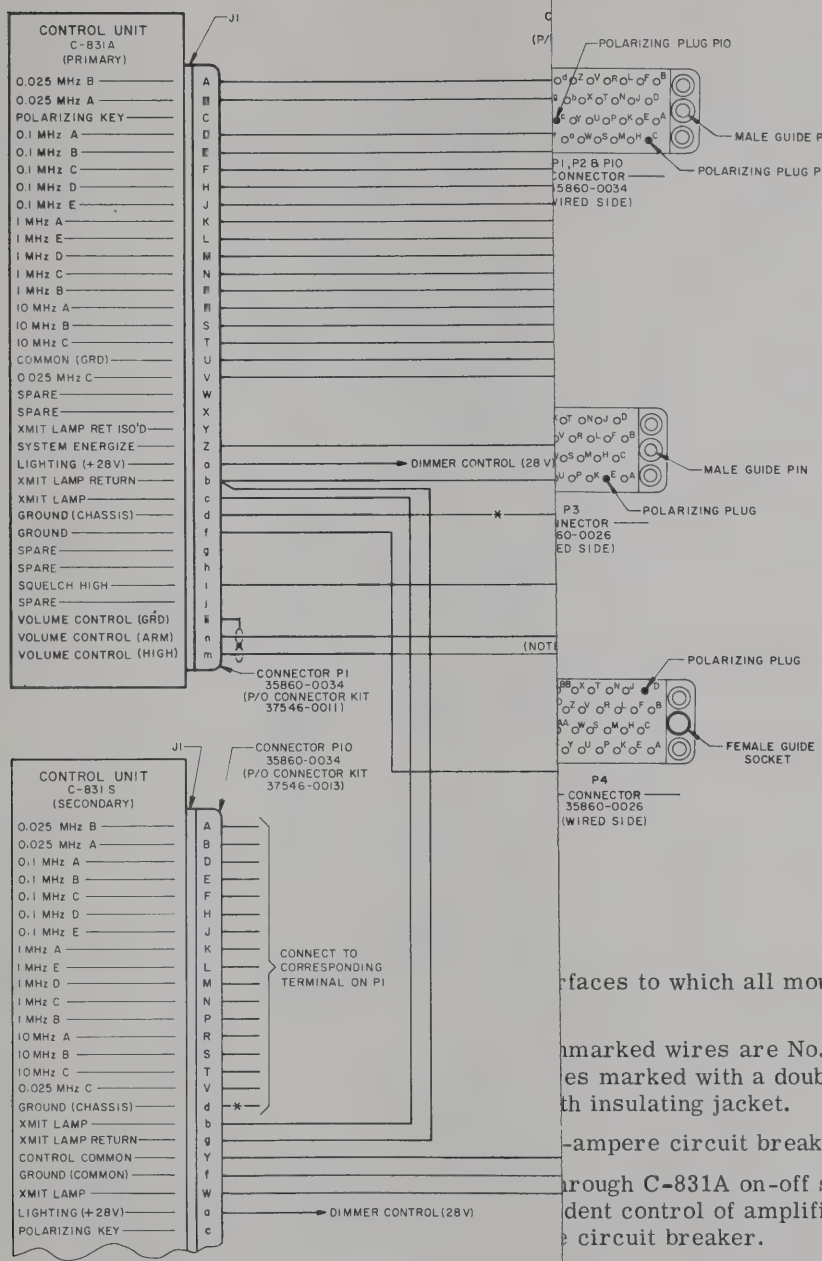




NOTES:

1. For proper grounding, aircraft surfaces to which all mountings are attached must be clean, bare metal.
2. All wires are stranded copper. Unmarked wires are No. 22 AWG. Wires marked with an asterisk (*) are No. 18 AWG. Wires marked with a double asterisk (**) are No. 16 AWG. Shielded wires are No. 22 AWG with insulating jacket.
3. Connect to 28-V source through 10-ampere circuit breaker.
4. For control of speaker amplifier through C-831A on-off switch, connect jumper between AA and CC as shown. For independent control of amplifier, delete jumper and connect CC to 28-V source through a 5-ampere circuit breaker.
5. Length of antenna cable must be 31 inches, or any multiple of 31 inches.
6. Audio outputs from other equipment may be connected through individual SPDT switches to the auxiliary inputs for speaker output.
7. In aircraft with high electrical noise level, use alternate method of volume control wiring, as shown in detail.

Figure 2-9. Cessna 800 Communication System, C-831A Control Unit, Interconnection Diagram



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800 Communication System, C-831A
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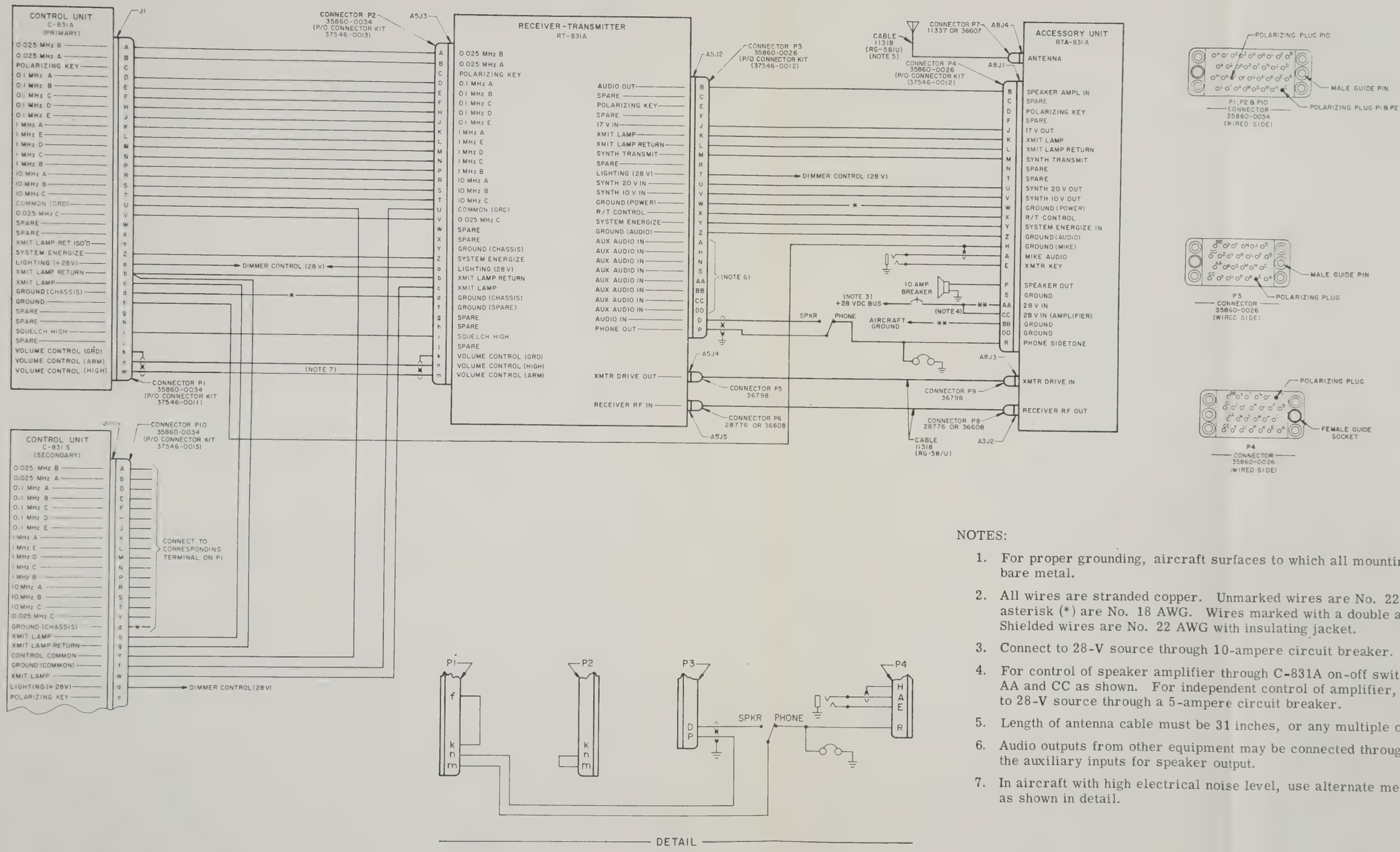


NOTES:

1. For proper grounding, aircraft surfaces to which all mountings are attached must be clean, bare metal.
2. All wires are stranded copper. Unmarked wires are No. 22 AWG. Wires marked with an asterisk (*) are No. 18 AWG. Wires marked with a double asterisk (**) are No. 16 AWG. Shielded wires are No. 22 AWG with insulating jacket.
3. Connect to 28-V source through 10-ampere circuit breaker.
4. For control of speaker amplifier through C-831A on-off switch, connect jumper between AA and CC as shown. For independent control of amplifier, delete jumper and connect CC to 28-V source through a 5-ampere circuit breaker.
5. Length of antenna cable must be 31 inches, or any multiple of 31 inches.
6. Audio outputs from other equipment may be connected through individual SPDT switches to the auxiliary inputs for speaker output.
7. In aircraft with high electrical noise level, use alternate method of volume control wiring, as shown in detail.

Figure 2-10. Cessna 800 Communication System, C-831A and C-831S Control Units, Interconnection Diagram

SECTION 3

OPERATION

3-1. OPERATING CONTROLS AND INDICATORS.

Operating controls and indicators for the Cessna 800 Communication System are located on the C-831A Control Unit and the optional C-831S Control Unit, shown in Figure 3-1. The functions of these controls and indicators are described in Table 3-1.

Note

The MHz and FRACT MHz designations are not marked on the control units.

TABLE 3-1. OPERATING CONTROLS AND INDICATORS

Designation	Control or Indicator	Function
VOL (C-831A only)	Primary Power and Receiver Volume Control.	Combined primary power and volume control. Clockwise rotation applies power. Further clockwise rotation increases audio level.
SQ (C-831A only)	Receiver Squelch Control.	Controls receiver squelch circuit. Counterclockwise rotation increases squelch action (silences receiver).
PRI-SEC (C-831S only)	Primary-Secondary Frequency Switch.	PRI position switches communication set to C-831A frequency. SEC position switches communication set to C-831S frequency.
MHz	Receiver-Transmitter Megahertz Selector.	Selects receiver-transmitter frequency in 1-MHz steps between 118 and 135 MHz.
FRACT MHz	Receiver-Transmitter Fractional Megahertz Selector.	Selects receiver-transmitter frequency in .025-MHz steps between .00 and .975 MHz.
---	Frequency Indicator.	Displays selected operating frequency.
---	Transmit Lamp.	Glows when transmitter is keyed.

3-2. OPERATING PROCEDURE.

Step 1. Turn VOL control on C-831A clockwise to apply power.

Step 2. Rotate MHz and FRACT MHz controls to select desired frequency.

Step 3. If optional C-831S is included, set PRI-SEC switch to PRI to operate on C-831A selected frequency, or to SEC to operate on C-831S selected frequency.

Step 4. Rotate SQ control clockwise until receiver noise output is heard; then, rotate SQ control counterclockwise until receiver noise output is barely audible.

Step 5. Adjust VOL control for comfortable audio level.

Step 6. To transmit, depress microphone button to key transmitter, and speak into microphone. Transmit lamp should glow.

Step 7. To receive, release microphone button.

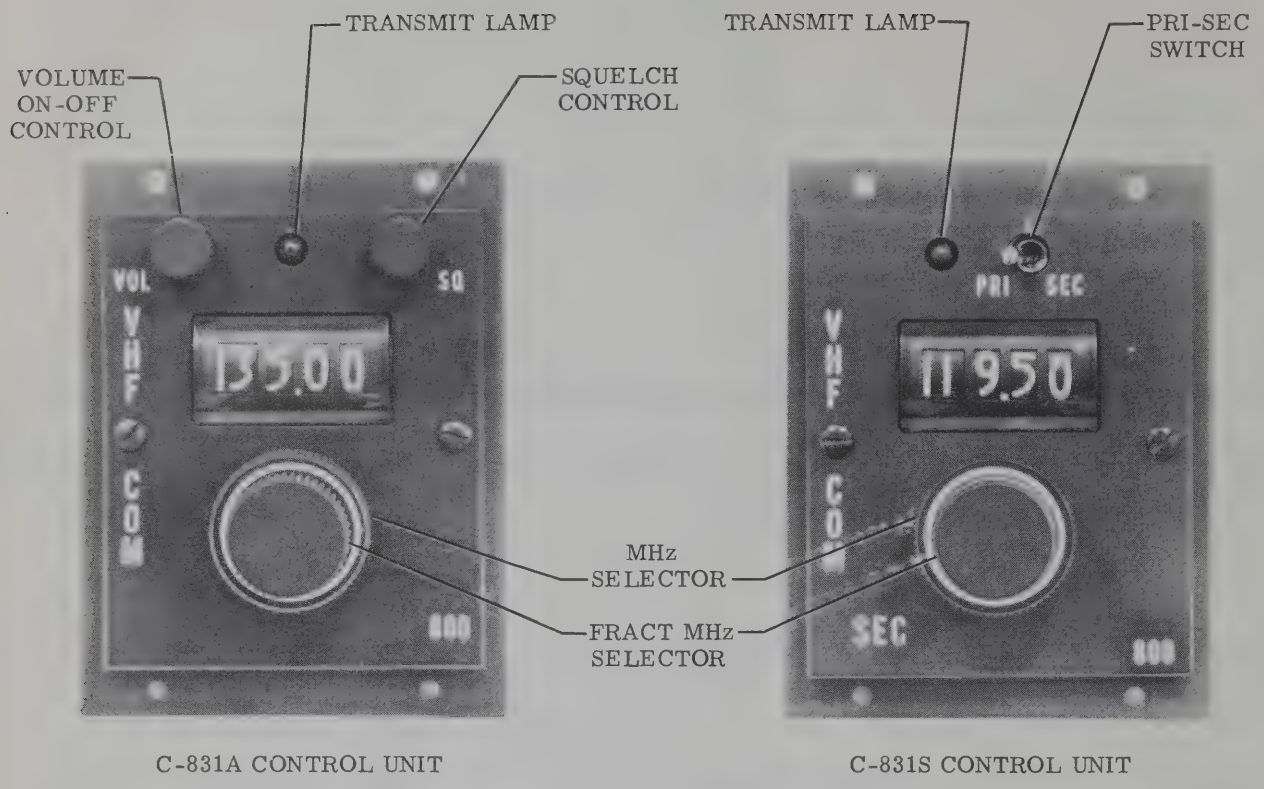


Figure 3-1. Cessna 800 Communication System, Operating Controls and Indicator

SECTION 4

PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

This section describes the principles of operation of the Cessna 800 Communication System. The circuits of the RT-831A Receiver-Transmitter are illustrated schematically in Figure 6-1, those of the RTA-831A Accessory unit in Figure 6-4, and those of the C-831A and C-831S Control Units in Figures 6-7 and 6-9. Schematic diagrams of some microcircuit assemblies are included in this section to supplement the circuit descriptions.

4-2. OVERALL FUNCTIONAL DESCRIPTION.

Power Distribution. Figure 4-1 shows the regulator circuits in the accessory unit used to convert the 27.5 Vdc input from the aircraft bus into voltages required for operation of the system. The 27.5 Vdc input is applied to the power switch in assembly A7 and, through fuse A5F1, to the 20-volt regulator in A5. The 27.5 Vdc input is also routed through fuse A5F2 and ac filter A8R1-A8C1 to modulator-amplifier A6. In later units, the 27.5 Vdc is not filtered and is applied directly from A5F2 to A6. When the on-off switch on the C-831A Control Unit is closed, the power switch and the transient protector in A7 are energized. The 27-volt output from the power switch is applied to the 17-volt regulator in A5, to relay delay A4 (earlier units only), and to the normally-open contacts of keying relay A8K2. When the microphone switch is closed, the 27-volt potential through A8K2 is applied to the 15-volt regulator in A7. The regulated 15-volt output is applied directly to transmitter-amplifier A1 and to the secondary winding of the modulator transformer in A6. The modulated supply current is applied to transmitter amplifier A1 at a 14-volt potential after a 1-volt drop through a load resistance in the modulator secondary circuit. If a short circuit occurs in any of the 27-volt load circuits, power switch A7Q1 is turned off for the duration of the short circuit. When the short circuit is removed, power switch A7Q1 may be reactivated by turning the control unit power switch off and then on.

The 20-volt output from the 20-volt regulator in A5 is distributed to modulator-amplifier A6 and to frequency synthesizer A4 in the receiver-transmitter. The 17-volt output from the regulator in A5 is distributed to keying relay A8K2 and through A8F1 and A8R7 to provide a 10-volt source for the receiver-transmitter.

In the receiver-transmitter, the 10-volt output from the accessory unit is applied to the 5-volt regulator in assembly A3 to produce a 5-volt dc input for frequency synthesizer A4. The 17-volt potential from the accessory unit is applied to audio amplifier A2A7, transmit-lamp switch A3Q5, and to the receiver circuits in assemblies A1 and A2.

Receiver Circuits. (See Figure 4-2.) When a communication frequency is selected on the control unit, the signal picked up by the antenna (118.000-135.975 MHz) is fed through the normally-closed contacts of antenna relay A8K1 in the accessory unit and through bandpass filter A3 to the receiver RF input of the receiver-transmitter. In the receiver-transmitter, the RF signal is amplified in an RF amplifier stage (A1A1) and mixed with the selected local oscillator signal (141.025-159.000 MHz) from the frequency synthesizer (A4) in a balanced mixer circuit (A1A2). The resulting first IF frequency (23.025 MHz) is filtered in a crystal filter (A2Z1) and amplified in a first IF amplifier stage (A2A1) before it is fed to the second mixer (A2A2). The second mixer also receives the output from a 27.245 MHz crystal-controlled oscillator (also part of A2A2). The two signals are heterodyned to produce the second IF frequency (4.22 MHz). This signal is amplified in a second IF amplifier (A2A3) and detected for the dc carrier level and audio component.

The detected audio signal and dc carrier signal are applied to a noise limiter, an AGC amplifier, and a dc amplifier (all part of A2A4). The audio signal, after passing through the noise limiter in A2A4, is fed to the AGC amplifier and to the A2A5 audio compressor. The AGC signal developed in the AGC circuit of A2A4 is returned to the RF amplifier circuit and to the two IF amplifier circuits to maintain a constant signal level. The audio input signal to the A2A5 audio compressor is leveled and applied to the A2A6 squelch assembly. The dc amplifier in A2A4, whose gain is controlled by the C-831A SQUELCH control, amplifies the dc carrier input signal and applies it to the A2A6 squelch assembly.

Squelch assembly A2A6 reduces background noise. The squelch level is established by the setting of the SQUELCH control. When the amplitude of the audio signal applied to the A2A6 squelch assembly is greater than the squelch level, the audio signal is fed across the volume control and applied to the audio amplifier (A2A7) for amplification. The gain of the A2A7 audio amplifier is varied by the volume control. The audio output from A2A7 is then applied to an external speaker-phone switch which routes the audio signal either to a headset or to modulator-amplifier A6 for amplification to drive the cabin speaker.

Transmitter Circuits. (See Figure 4-3.) In earlier production units, when the microphone switch is closed, a ground return signal is applied to the coil of antenna relay A8K1, causing 27 volts through relay delay circuit A4 to energize the relay. The communication antenna then is connected through the normally-open contacts of A8K1 to the output of the transmitter circuit. After a delay of approximately 20 milliseconds, a signal from the relay delay circuit also energizes keying relay A8K2. This delay prevents keying of the transmitter without a load. In later units, when the microphone switch is closed, a ground return signal is applied to the coils of antenna relay A8K1 and keying relay A8K2, allowing the 27 volts from A7 to energize the relays. The communication antenna is connected through the normally-open contacts of A8K1 to the output of the transmitter circuit. The 15-volt regulator in transient protector power switch A7 is energized through A8K2 to supply the operating voltage to the transmitter, and a disable signal from A8K2 is applied to the 15-volt switch circuit in the receiver-transmitter to turn off the receiver circuits for the duration of the keyed condition. A keying signal from A8K2 is applied to frequency synthesizer A4 in the receiver-transmitter to switch the frequency synthesizer to the transmit function. The frequency synthesizer produces the selected low-voltage RF signal (118.00-135.975 MHz) which is applied to the transmitter circuits in the accesory unit.

In transmitter-amplifier assembly A1, the RF signal from the frequency synthesizer is amplified in first and second RF amplifiers A1Q1 and A1Q2, pre-driver and driver amplifiers A1Q3 and A1Q4, and push-pull power amplifier A1Q5 and A1Q6.

A signal from the microphone switch is also applied to the audio switch circuit (A6A2) of the accessory unit to switch the modulator-amplifier to the modulator function. The microphone audio input signal is applied to the audio limiter circuit (A6A1) and through the energized audio switch (A6A2) to the audio amplifier circuits in A6A3 and A6Q1 and A6Q2 for power amplification.

A modulated 14-volt signal from A6 is applied to all of the transmitter amplifier stages in A1 to modulate the transmitter output signal. The modulated output signal from the transmitter (118.000-135.975 MHz) is applied through a harmonic filter (A2) and energized antenna relay A8K1 to the communication antenna.

4-3. RECEIVER-TRANSMITTER CIRCUITS.

General. (See Figure 6-1.) The RT-831A Receiver-Transmitter consists of four individual assemblies and one chassis assembly. The principles of operation for assemblies A1, A2, and A3 are discussed in the following paragraphs. Frequency synthesizer assembly A4, which uses solid-state logic, digital, and linear circuits to produce the selected transmitter RF frequency and the corresponding receiver local oscillator signal, is a sealed unit. The principles of operation of the frequency synthesizer are not described.

RF Assembly A1. (See Figure 6-1.) RF assembly A1 of the receiver-transmitter consists of RF amplifier assembly A1A1 and balanced mixer assembly A1A2.

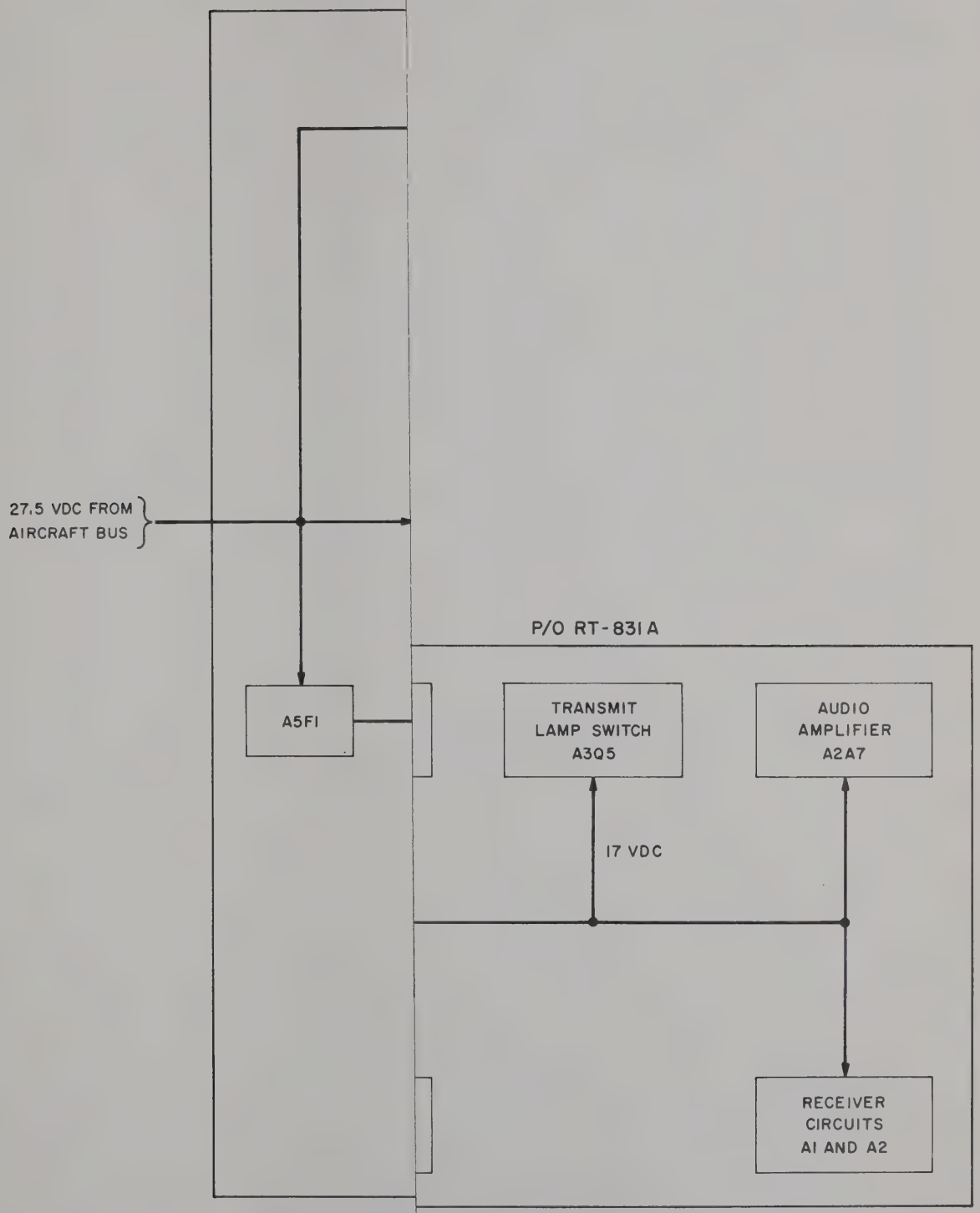
RF Amplifier A1A1. RF amplifier assembly A1A1 amplifies the receiver RF input signal. RF amplifier A1A1Q1 uses an untuned, broadbanded common-emitter amplifier circuit to provide a 20-dB gain across the 118.000 to 135.975 MHz band. The circuit gain is controlled by an AGC bias signal of 0.2-7 volts applied through AGC diode A1A1CR1 to the amplifier input circuit.

Balanced Mixer A1A2. Balanced mixer A1A2 mixes the amplified RF signal from A1A1 with the selected frequency synthesizer signal from A4 to produce a first IF signal of 23.025 MHz. The balanced mixer uses a pair of matched field-effect transistors (A1A2Q1 and A1A2Q2) connected in push-pull. The RF signal from A1A1 is applied to the gates of the transistors, while the local oscillator signal from the frequency synthesizer is applied to the source. Bias potentiometer A1A2R3 is used for adjustment of mixer gain. Diode A1A2CR1 provides a minimum bias of approximately 0.6 volt. Potentiometer A1A2R2 in the local oscillator input circuit and capacitor A1A2C7 are used for mixer balance adjustment. The mixer balance provides at least 60 dB rejection to in-band spurious signals which are above the desired signal by half the first IF frequency. The balanced mixer output is tuned by capacitor A1A2C8 and coupled through A1A2T2 to the 23.025-MHz crystal filter is assembly A2 of the receiver-transmitter.

IF and Audio Assembly A2. IF and audio assembly A2 consists of seven microcircuit subassemblies and a crystal filter. Crystal filter A2Z1, which has a pass bandwidth of ±18 kHz, provides the overall selectivity of the receiver. The operation of the seven microcircuit subassemblies is discussed individually in the following paragraphs. Unless otherwise noted, the circuits are illustrated in Figure 6-1.

First IF Amplifier A2A1. First IF amplifier assembly A2A1 amplifies the 23.025-MHz IF signal and feeds it to the second mixer in A2A2. The A2A1 circuit includes a field-effect transistor (FET) for automatic gain control and an NPN transistor for amplification. The input circuit is tuned to 23.025 MHz by capacitor A2A1C10 to provide a resistive termination of 560 ohms for the crystal filter. An AGC signal from A2A4 is applied to the gate circuit of the FET for output stabilization. The output amplifier uses a common-emitter amplifier circuit with gain adjustable by means of A2A1R11. The output circuit is tuned to 23.025 MHz by A2A1C9, and the output signal is transformer-coupled to second mixer A2A2.

Second IF Amplifier A2A3. Second IF amplifier A2A3 amplifies the 4.22-MHz second IF signal and provides detected audio and dc carrier outputs. A low-pass filter in the input attenuates the first IF and second oscillator frequencies. An FET transistor used in the input amplifier circuit provides gain control through AGC action. A tuned circuit in the collector of the output amplifier further attenuates spurious signals before the 4.22-MHz signal is applied to the



*NOT USED IN

ommunication System,
Block Diagram

Transmitter Circuits. (See Figure 4-3.) In earlier production units, when the microphone switch is closed, a ground return signal is applied to the coil of antenna relay A8K1, causing 27 volts through relay delay circuit A4 to energize the relay. The communication antenna then is connected through the normally-open contacts of A8K1 to the output of the transmitter circuit. After a delay of approximately 20 milliseconds, a signal from the relay delay circuit also energizes keying relay A8K2. This delay prevents keying of the transmitter without a load. In later units, when the microphone switch is closed, a ground return signal is applied to the coils of antenna relay A8K1 and keying relay A8K2, allowing the 27 volts from A7 to energize the relays. The communication antenna is connected through the normally-open contacts of A8K1 to the output of the transmitter circuit. The 15-volt regulator in transient protector power switch A7 is energized through A8K2 to supply the operating voltage to the transmitter, and a disable signal from A8K2 is applied to the 15-volt switch circuit in the receiver-transmitter to turn off the receiver circuits for the duration of the keyed condition. A keying signal from A8K2 is applied to frequency synthesizer A4 in the receiver-transmitter to switch the frequency synthesizer to the transmit function. The frequency synthesizer produces the selected low-voltage RF signal (118.00-135.975 MHz) which is applied to the transmitter circuits in the accesory unit.

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Second IF Amplifier A2A3. Second IF amplifier A2A3 amplifies the 4.22-MHz second IF signal and provides detected audio and dc carrier outputs. A low-pass filter in the input attenuates the first IF and second oscillator frequencies. An FET transistor used in the input amplifier circuit provides gain control through AGC action. A tuned circuit in the collector of the output amplifier further attenuates spurious signals before the 4.22-MHz signal is applied to the

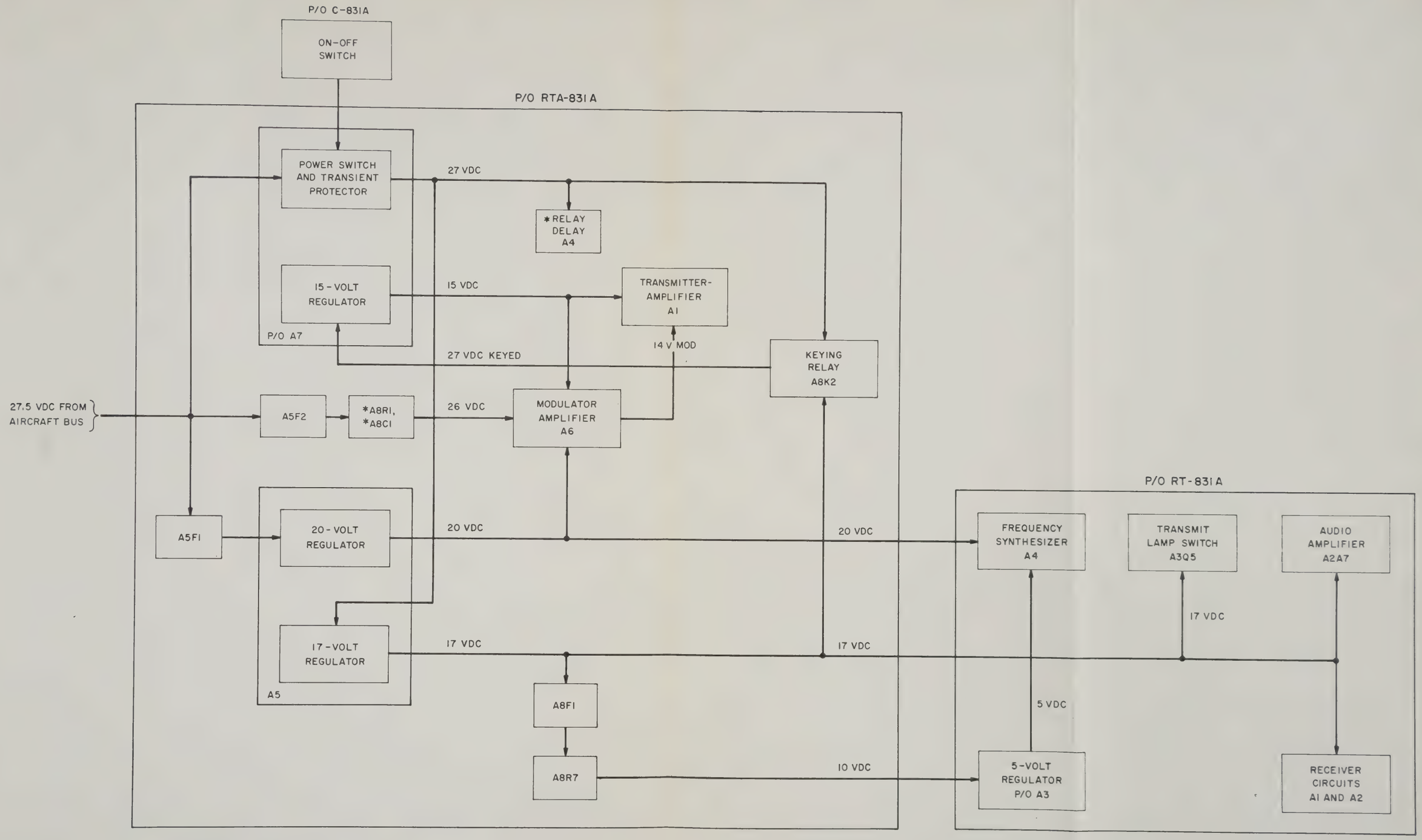

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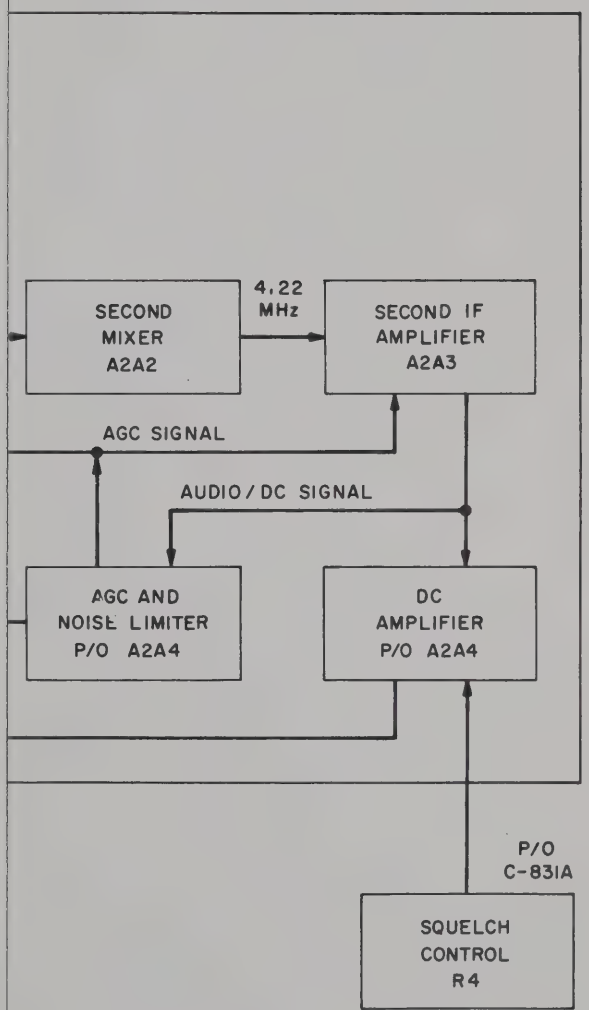
Figure 4-1. Cessna 800 Communication System, Power Distribution Block Diagram



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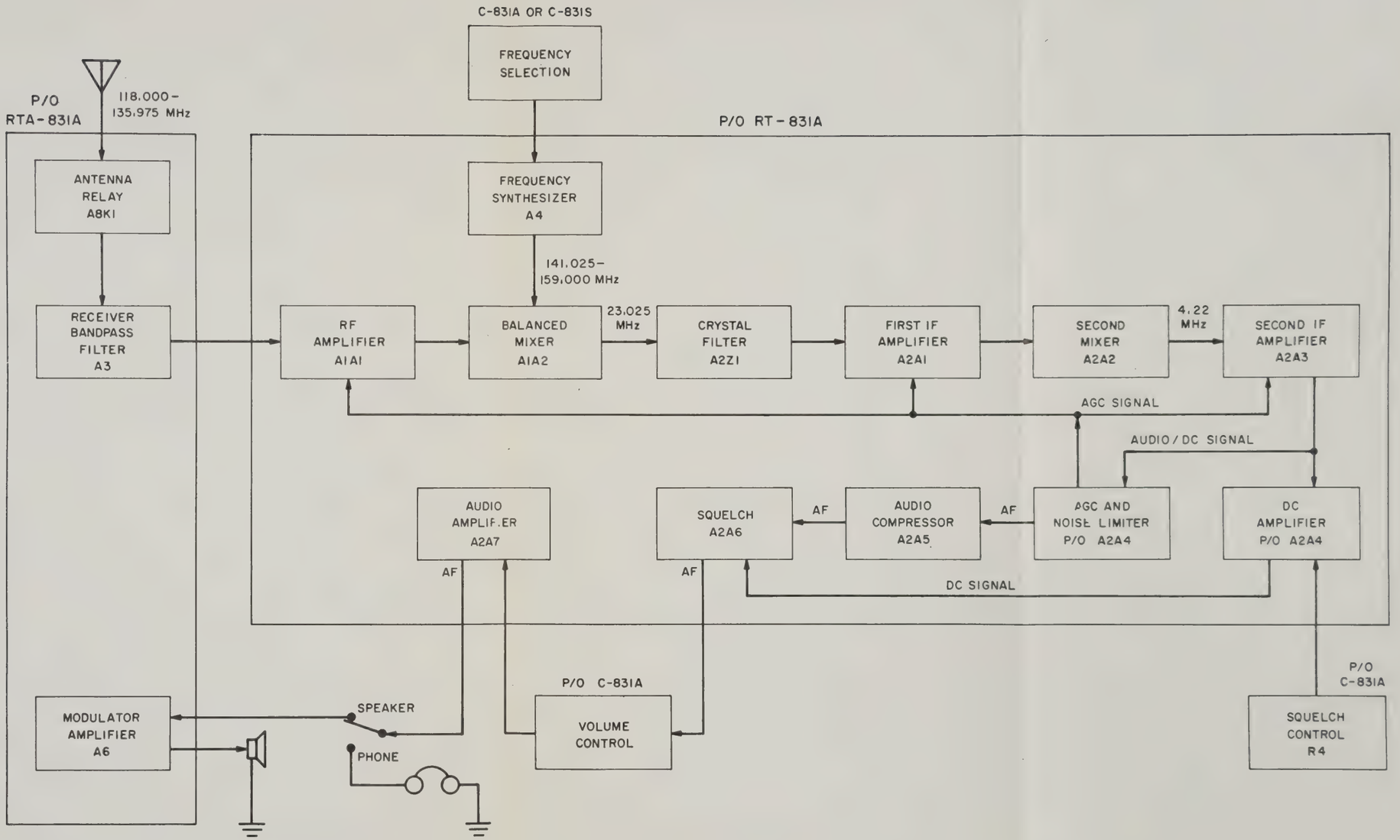
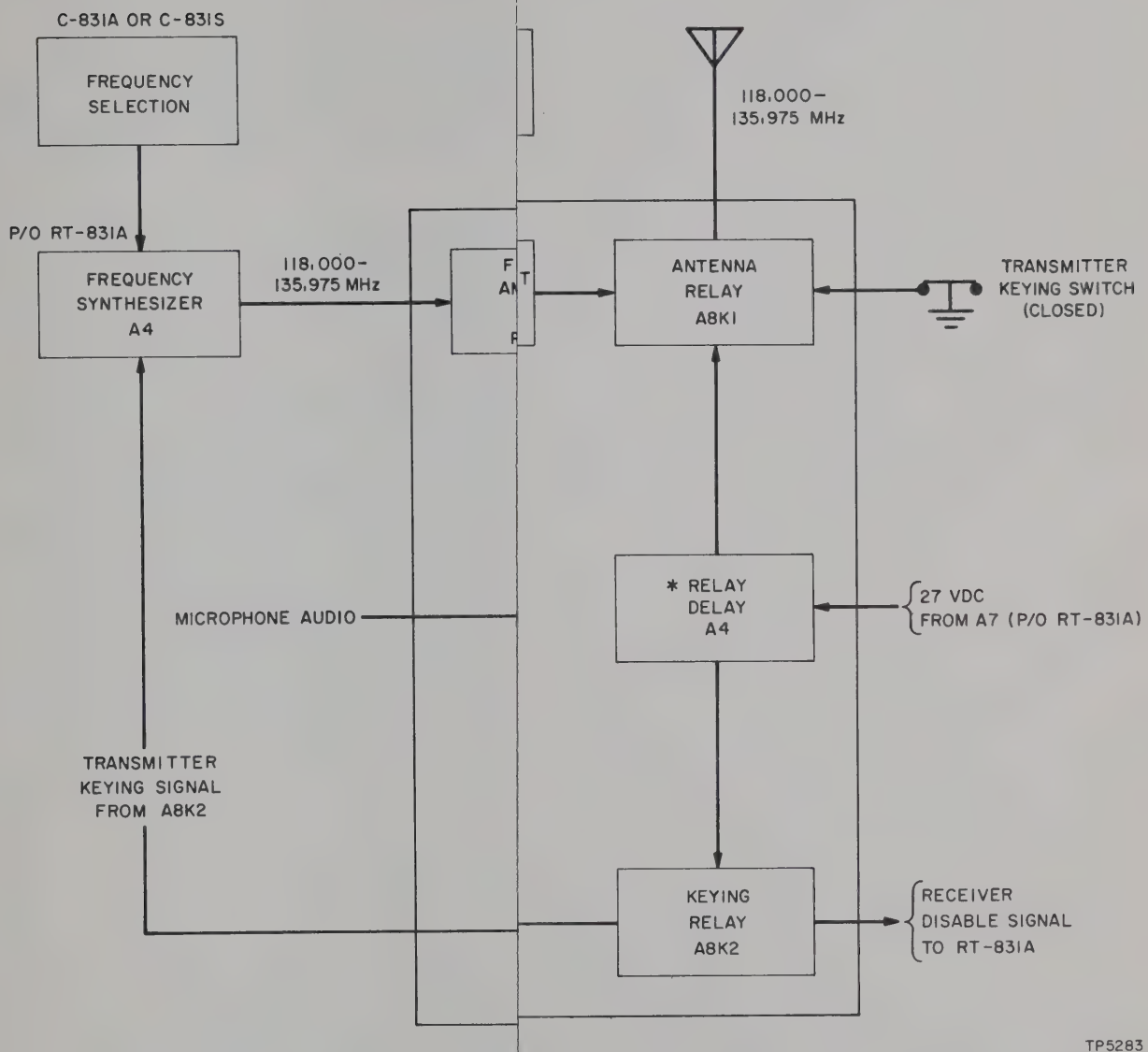


Figure 4-2. Cessna 800 Communication System, Receiver Circuits Block Diagram



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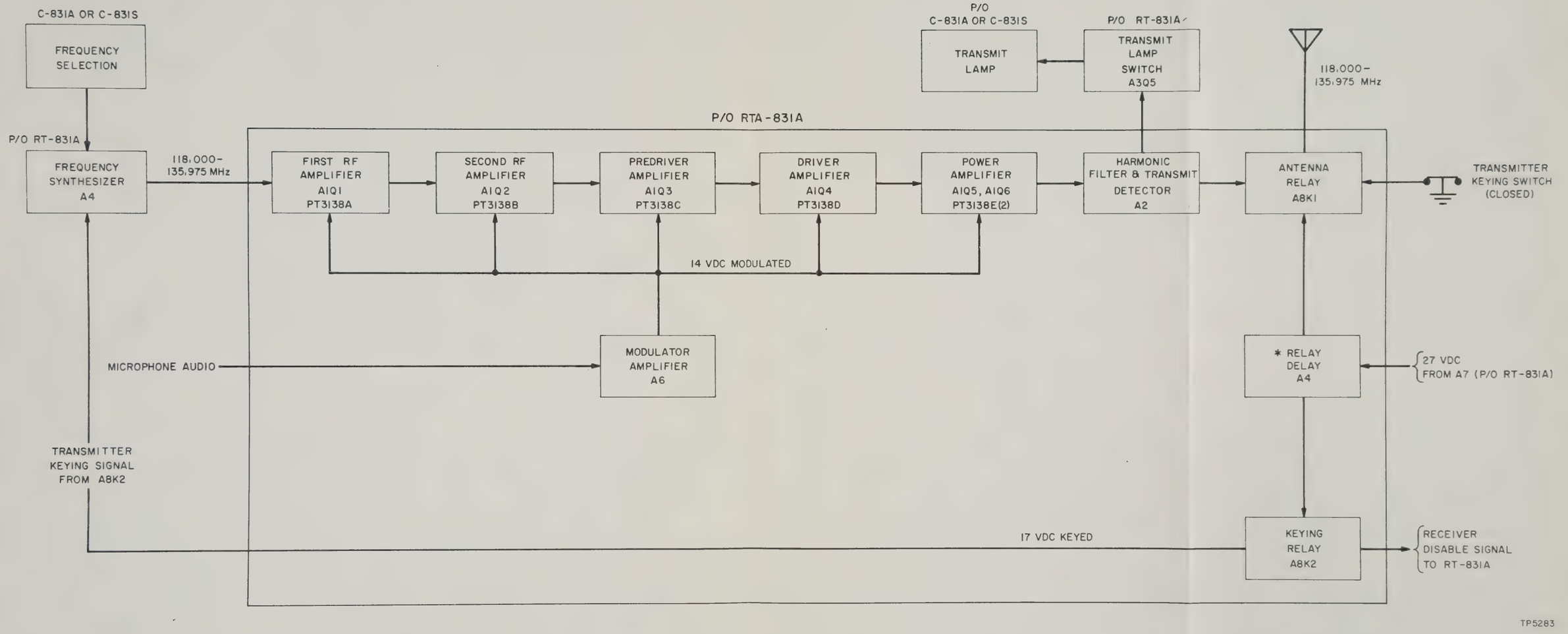


*NOT USED IN ALL UNITS

Figure 4-3. Cessna 800 Communication System, Transmitter Circuits Block Diagram

diode detector through the secondary of the output transformer. The detected audio and dc carrier signals are applied to AGC assembly A2A4.

AGC Assembly A2A4. AGC assembly A2A4 includes a dc amplifier, a noise limiter, and an AGC amplifier. After R-C filtering to remove the audio component, the detected second IF signal from A2A3 is applied to the dc amplifier and AGC amplifier.

The noise limiter uses a series diode audio switch to interrupt the audio during impulse noise spikes. This circuit provides a time constant to delay the application of the positive noise pulse to the anode while applying it undelayed to the cathode of the switch diode.

The dc amplifier is a two-transistor amplifier which amplifies the detected dc carrier signal for application to the squelch gate in squelch assembly A2A6. The gain of the dc amplifier is varied by the SQUELCH control on the C-831A Control Unit.

The AGC amplifier consists of two transistor amplifier circuits and an emitter-follower. Resistor A2A4R8 in the emitter circuit of the first transistor varies the AGC amplifier gain. The AGC signal of the emitter-follower is applied to RF amplifier A1A1, first IF amplifier A2A1, and second IF amplifier A2A3 to hold the gain of these stages constant.

Audio Compressor A2A5. Audio Compressor A2A5 maintains a constant audio signal level so that only one volume control setting is required for a signal with varying modulation. (See Figure 4-4.) The audio signal from the noise limiter circuit in A2A4 is applied to the gate of FET Q1. The audio output from the drain of Q1 is coupled through C5 to a closed-loop leveling amplifier consisting of Q3 and Q2. The output of Q2 is transformer-coupled to a full-wave bridge for rectification. The resultant dc controls the gain of Q1. Thus, the audio output is held constant by a feedback loop. Compressor gain adjustment R1 is normally adjusted so that with a modulation variation of from 30% to 85% there is less than a 3-dB rise in the audio output signal level. Compressor output adjustment R8 sets the audio output signal to the rated output of 5 volts across a 250-ohm load. The compressed audio signal from A2A5 is applied to the squelch switch in A2A6.

Squelch Assembly A2A6. The A2A6 squelch assembly contains circuits which can mute the receiver when no signal is present and which can eliminate or minimize atmospheric and circuit background noise during signal reception. The squelch level is determined by the setting of the C-831A SQUELCH control, which controls the gain of the dc amplifier in A2A4. Squelch assembly A2A6 consists of Schmitt-trigger squelch gate Q1 and Q2, and squelch switch CR1. (See Figure 4-5.) When no signal is present, squelch gate transistor Q1 is turned off and Q2 is turned on. As transistor Q2 conducts, the positive potential at its collector decreases and back-biases switching diode CR1, causing the diode to switch off. If the squelch level is set just above the noise level, the receiver output is muted.

When an amplitude-modulated signal is detected by the receiver, the dc carrier signal from the dc amplifier in A2A4 is fed to the base of the Q1 input transistor in the squelch gate, and the audio component

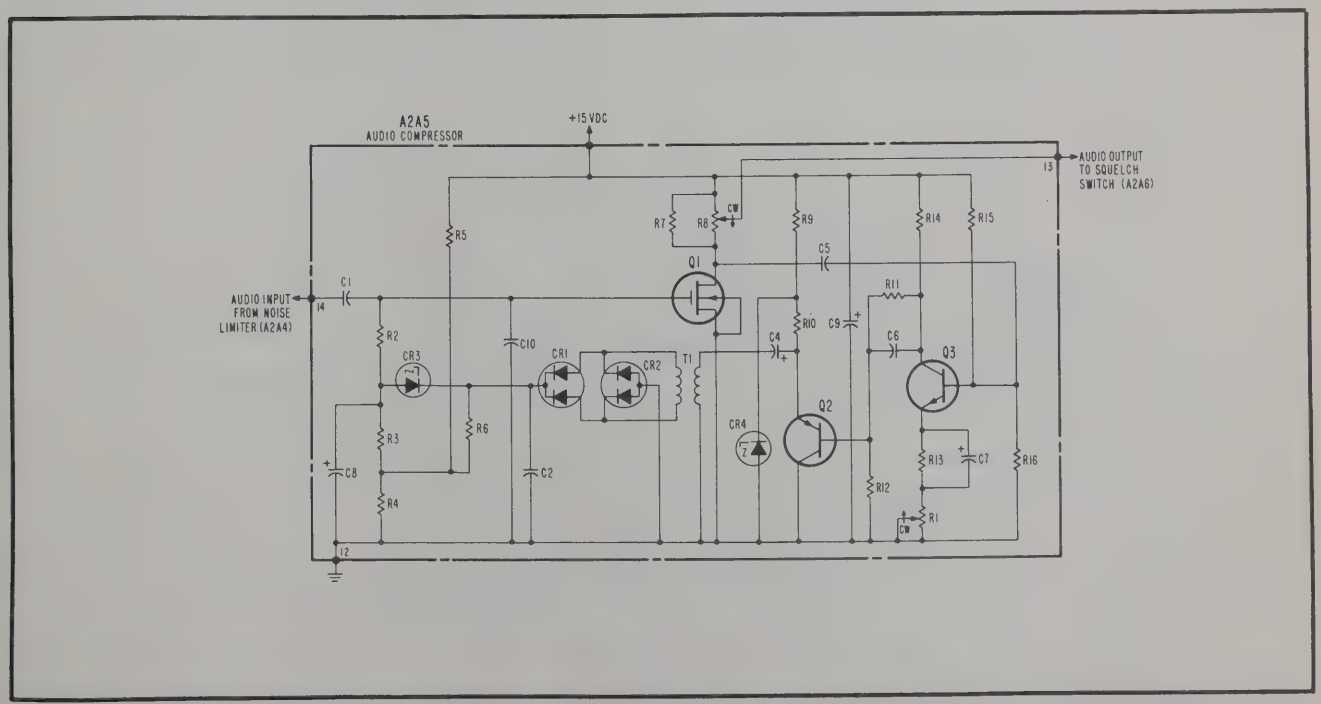


Figure 4-4. RT-831A Receiver-Transmitter, Audio Compressor A2A5, Simplified Schematic Diagram

from audio compressor A2A5 is applied to the anode side of switching diode CR1. The dc carrier signal turns on squelch gate transistor Q1, which turns off transistor Q2. The nonconducting state of Q2 causes the potential at its collector to become fully positive, biasing switching diode CR1 in the forward direction. With diode CR1 switched on, the audio signal is gated across the volume (VOL) control in the C-831A Control Unit and applied to audio amplifier A2A7.

Audio Amplifier A2A7. Audio Amplifier A2A7 amplifies the audio signal from the squelch circuit and applies it through A2T1 to the receiver phone output. The circuit includes an RCA CA3020 integrated circuit which amplifies the audio signal to a phone output level of 100 milliwatts.

Regulator Assembly A3. Regulator assembly A3 consists of a 5-volt regulator circuit and a transmit-lamp switch circuit. The 5-volt regulator circuit converts the 10-volt input from the accessory unit to a regulated 5-volt output for use in frequency synthesizer A4. Series regulator A3Q1 is driven by A3Q2 and A3Q3. Voltage sensor A3Q4 and reference diode A3VR1 provide stabilization of the 5-volt output.

In the transmit-lamp switch circuit, A3Q5 functions as a switching transistor. Each time the transmitter is keyed, transistor A3Q5 is forward biased by a rectified sample of the transmitted RF power. During each transmit cycle, transistor A3Q5 switches the rectified RF voltage to the transmit lamp on the control unit, causing the lamp to glow.

4-4. ACCESSORY UNIT CIRCUITS.

General. (See Figure 6-4.) The accessory unit consists of seven individual assemblies (six in later units, in which A4 is omitted) and one chassis assembly. The operation of assemblies A1 through A7 are discussed in the following paragraphs. The operation of relays A8K1 and A8K2 and other components of chassis assembly A8 are discussed with the circuits related to their operation.

Transmitter Amplifier A1. Transmitter amplifier A1 includes all of the transmitter RF amplifier circuits. It consists of two Class A RF amplifier stages, a Class AB predriver amplifier, a Class C driver amplifier, and a Class C push-pull power amplifier. The six transistors used are a matched set, but any of them may be individually replaced. All five stages use common-emitter amplifier circuits with transformer coupling between stages.

When the microphone switch is closed, 15 volts from assembly A7 is applied through A1CR1 to all five stages. To produce linear modulation, a modulated 14-volt signal from modulator-amplifier A6 is also applied to all five stages. Clamping diode A1CR1 prevents downward modulation signals from driving the 14-volt bus in a negative direction. Steering diodes A1CR2 and A1CR3 cause more upward modu-

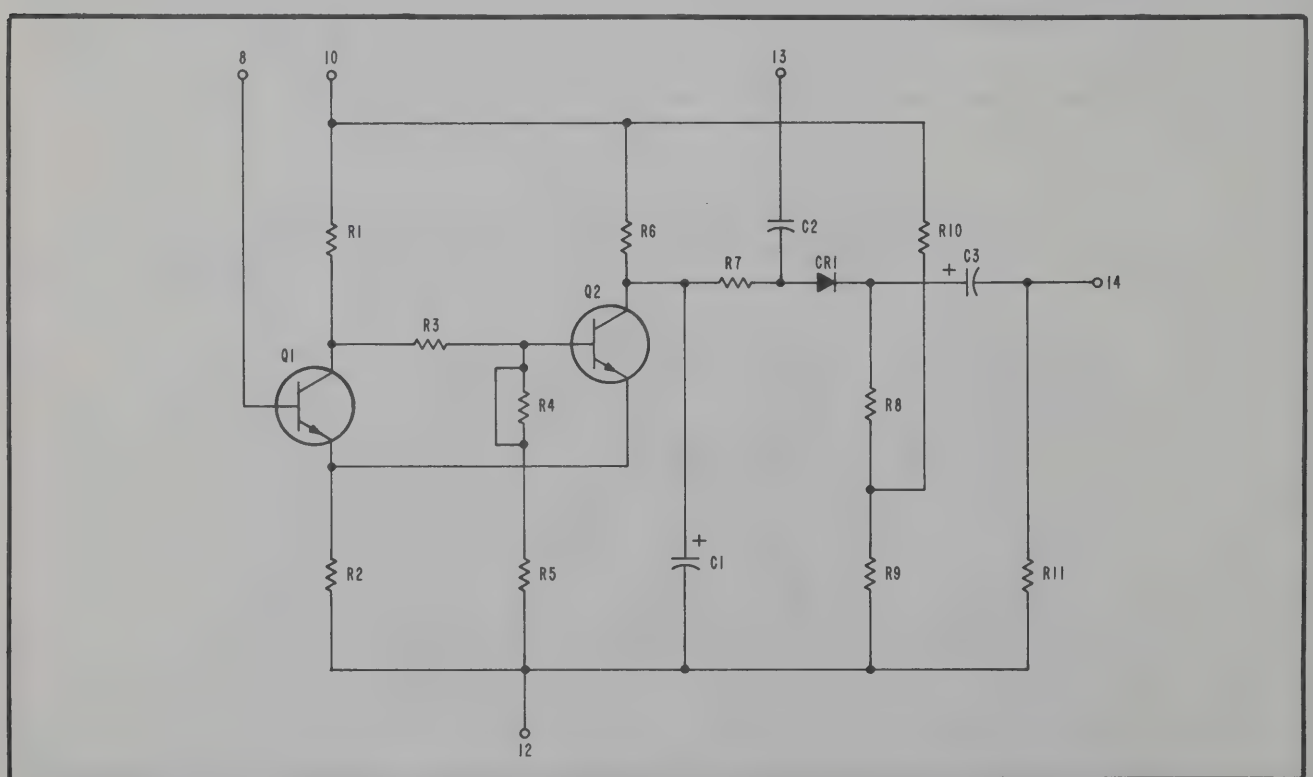


Figure 4-5. RT-831A Receiver-Transmitter, Squelch Assembly A2A6, Simplified Schematic Diagram

lation signals to be applied to the RF amplifier and predriver stages so that an improved level of modulation is maintained by automatically increasing the drive level on upward modulation peaks. Modulation limiter A1CR4 prevents overmodulation and possible power amplifier transistor breakdown. The transmitter signal from A1 is applied to harmonic filter and transmit detector A2.

Harmonic Filter and Transmit Detector A2. Assembly A2 consists of a harmonic filter and a transmit detector circuit. The harmonic filter is a conventional low-pass filter with a cutoff between 140 and 150 MHz which suppresses harmonics of the transmitter output signal.

The transmit detector circuit essentially consists of inductor L5 and diode CR3. L5 inductively couples a sample of the transmitted RF signal to diode CR3 where it is rectified. The rectified RF signal then is fed to the transmit lamp switch (A3Q5) in the receiver-transmitter.

Bandpass Filter A3. Bandpass filter A3 is inserted in the receiver antenna input circuit between the antenna and coaxial antenna relay A8K1. It is a broadband passive filter with a passband of 118 to 136 MHz and a center frequency of 127 MHz. The insertion loss of the filter is approximately 3 dB between 118 and 136 MHz. The filter output is connected directly to the receiver input in the receiver-transmitter.

Relay Delay A4. (See Figure 4-6.) The relay delay assembly provides a timing circuit which prevents the transmitter-amplifier circuits from being energized until the antenna circuit is connected to the transmitter. Relay delay assembly A4 directly controls the energized circuits of antenna relay A8K1 and keying relay A8K2. When the 831A is energized, 27 volts from A7 is applied to terminal 4 of A4. When the microphone switch is closed, terminal 5 of A8K1 and terminal 1 of A4 are placed at ground potential, forward-biasing blocking diodes CR1 and CR2. The 27-volt source from A7 is applied through the diodes to terminal 4 of A8K1, energizing the antenna relay approximately 10 ms after the keying switch is closed.

At the same time, the 27-volt potential is applied to the input of Q1. The voltage drop across CR1 and CR2 charges C2 through R2 causing the transistor to conduct after a brief delay. A 26.4-volt signal in the output of Q1 is applied to terminal 13 of A8K2, energizing the keying relay approximately 20 ms after the microphone switch is closed. A 27-volt signal through the normally-open contacts of A8K2 is applied to the 15-volt regulator circuit in A7 to provide a low-voltage input to the transmitter. The operating delay of approximately 20 ms for A8K2 assures that the antenna circuit is switched to the transmitter output before power can be applied to the transmitter.

When the transmitter microphone switch is released, diode CR4 turns A8K2 off rapidly (within 10 ms) and provides reverse polarity protection for Q1. The current through the coil of A8K1 is maintained by the discharge of C1 delaying the dropout of A8K1 for approximately 25 ms after the microphone switch has been released.

Regulator A5. Regulator A5 includes a 20-volt regulator circuit and a 17-volt regulator circuit to convert the 27.5-volt primary input to a 20-volt output and a 17-volt output for use in the receiver-transmitter and accessory unit circuits. The 27.5-volt input to the 20-volt regulator is applied through fuse A5F1 directly from the aircraft primary source so that the

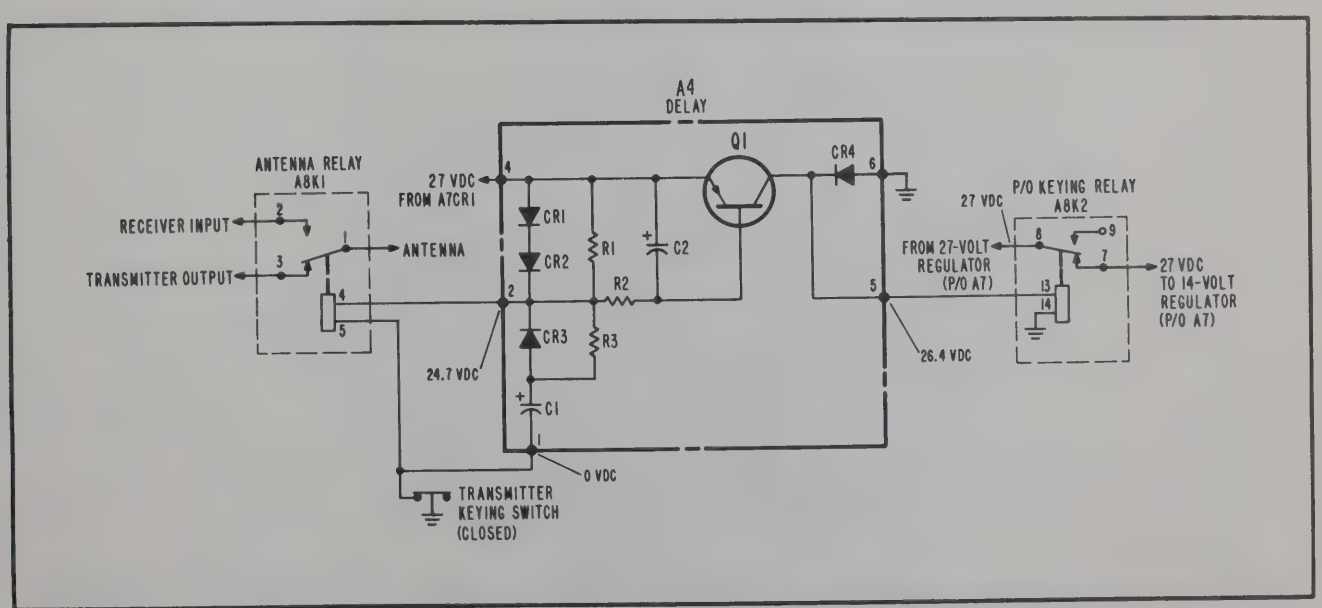


Figure 4-6. RTA-831A Accessory Unit, Relay Delay A4, Simplified Schematic Diagram

speaker amplifier circuit in A6 can be energized independently. The 20-volt regulator comprises current amplifier A5Q1, pass amplifier A8Q1, voltage sensor A5Q2, blocking diode A5CR5, voltage dropping Zener diode A5CR2, and reference Zener diode A5CR1. The 20-volt output is distributed as described in paragraph 4-2.

The 27-volt input to the 17-volt regulator is supplied through the transient protector power switch in assembly A7. The 17-volt regulator circuit consists of current amplifier A5Q4, pass amplifier A8Q2, voltage sensor A5Q5, voltage reference Zener diode A5CR3, and voltage dropping Zener diode A5CR4. The 17-volt output is distributed as described in paragraph 4-2.

Modulator-Amplifier A6. Modulator-amplifier A6 amplifies the audio signal to drive the cabin speaker during the receive cycle and limits and amplifies the modulation signal during the transmit cycle. The assembly contains three microcircuit subassemblies and a power amplifier circuit. The microcircuit subassemblies are audio limiter A6A1, audio switch A6A2, and audio amplifier A6A3.

Audio Limiter A6A1. Audio limiter A6A1 prevents over-modulation of the transmitter by limiting the audio signal level which is applied to the modulation amplifier. When the microphone switch is closed, the microphone audio signal is applied to input terminal 7 of the audio limiter, and 15 volts from A7 is applied through A8J5 and A6P3 to the resistor bias network in A6A1. The level of limiting can be varied by the setting of A6A1R4 (see Figure 6-4). When the microphone signal exceeds the preset level established by A6A1R4, the limiting diodes in the circuit clip the positive and the negative peaks from the signal to maintain a peak swing of approximately 0. 6 volt. The output level for the circuit is established by the setting of A6A1R5. A6A1R5 in conjunction with its shunt output capacitor provides reduction of harmonic distortion by rolling-off the higher frequencies. The limited audio signal from A6A1 is applied to audio switch assembly A6A2.

Audio Switch A6A2. Audio switch assembly A6A2 determines whether the audio signal from the receiver or from the microphone is applied to audio amplifier A6A3. (See Figure 4-7.) During the receive cycle (microphone switch open), switching diode CR1 is forward-biased so that the audio signal from the receiver is applied to audio amplifier Q1. When the microphone switch is closed, it connects control diode CR3 to ground, turning on CR2. With CR2 forward-biased, CR1 is turned off, connecting the microphone audio signal through CR2 to the input of amplifier Q1. The amplified signal from Q1 (receiver audio or microphone audio) is applied to audio amplifier A6A3.

Audio Amplifier A6A3 and Power Amplifier. Audio amplifier A6A3 amplifies the receiver audio or the microphone audio input signal and provides a split-phase output to drive the push-pull power amplifier in A6. The assembly includes a voltage regulator circuit, an input amplifier, a phase splitter, and two emitter-follower circuits. Power amplifier A6Q1 and A6Q2 is a push-pull amplifier; its output is transformer-coupled to the transmitter and speaker circuits.

The voltage regulator in A6A3 consists of a single transistor circuit and a Zener diode which convert the 20-volt potential from A5 to a regulated 15-volt supply for use in assemblies A6A2 and A6A3. The input audio amplifier uses a conventional common-emitter amplifier circuit to provide voltage amplification for the audio signal from A6A2. This amplified audio signal then is applied to the phase splitter,

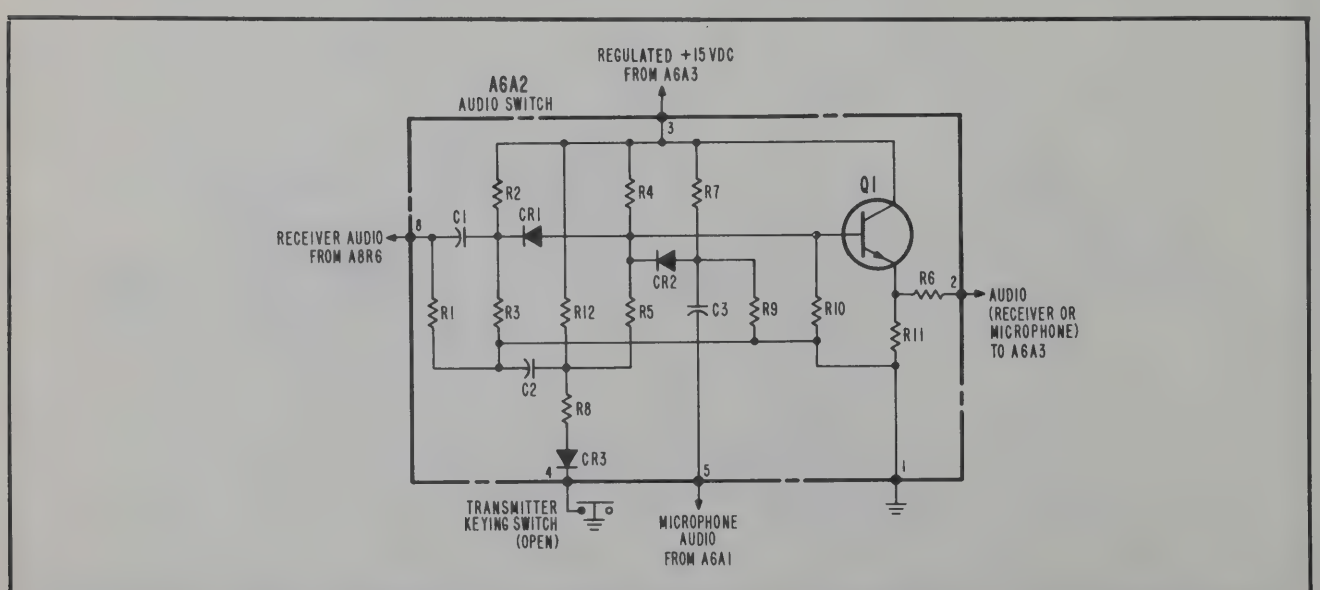


Figure 4-7. RTA-831A Accessory Unit, Audio Switch A6A2, Simplified Schematic Diagram

where the positive-going portion of the audio in the collector circuit is applied to one emitter-follower, and the negative-going portion of the audio signal in the emitter circuit is applied to the other emitter-follower. The positive-going portion of the audio signal is applied to power amplifier A6Q1 and the negative-going portion to A6Q2. The two diodes in A6A3, along with biasing diodes A6CR1 and A6CR2, are used to minimize the cross-over distortion in the power amplifier circuit and to provide temperature compensation for the power amplifier transistors.

Push-pull power amplifier A6Q1 and A6Q2 amplifies the two portions of the audio signal and applies them simultaneously to the input winding of A6Q2 is returned as negative feedback to the emitter circuit of the input amplifier in A6A3 to reduce distortion and to maintain a constant output level. Output transformer A6T1 uses separate output windings to supply the two functions of the audio amplifier. When the Cessna 800 Communication System is used for reception, output winding 6, 7 supplies the amplified audio signal to the cabin speaker. During transmission, output winding 4, 5 supplies a modulated 14-volt signal to transmitter-amplifier A1 to modulate the transmitter amplifier stages; also, output winding 6, 7 supplies a sidetone signal through A8R3 and A8R5 to the headset and speaker circuits. Zener diode A8CR1 is a voltage-dropping diode which reduces the 20-volt signal from A5 to 7.8 volts for use in the amplifier circuits of A6.

Transient Protector Power Switch A7. Transient protector power switch A7 includes a 27-volt power switch and a 15-volt regulator circuit. The 27-volt power switch provides a switched 27-volt source and protects the various circuits of the set from transients on the primary line. It also includes a switch circuit which shuts off the equipment when there is a short circuit on the 27-volt bus. The 27.5-volt input from the aircraft primary source is applied to the collector circuit of A7Q1. When the on-off switch on the control unit is closed, it completes the ground circuit for reverse-polarity-protection diode A7CR4. The charging current of A7C2 turns on power switch A7Q3, which turns on 27-volt switch A7Q1, A7Q2. A7Q3 in turn is held on by the 27-volt output of A7Q1. Blocking diode A7CR1 is forward-biased, applying a 27-volt signal to relay delay assembly A4, or directly to A8K1 and A8K2 in later units. The 27-volt output is applied to the 17-volt regulator circuit in A5 and to the normally open contacts of keying relay A8K2. When a short circuit is present on the 27-volt output line, the forward bias on A7Q3 is reduced below the conduction level so that A7Q3 is turned off, turning off the 27-volt circuit for the duration of the short circuit.

When the transmitter keying switch is closed, A8K2 is energized. The 27-volt supply through A8K2 is applied to the 15-volt regulator circuit in A7. Regulators A7Q4 and A7Q5 are connected in parallel and driven by A7Q6 which is controlled by voltage sensor A7Q7 and reference Zener diode A7CR6 to provide a regulated 15-volt supply for the transmitter circuits.

SECTION 5

MAINTENANCE

5-1. INTRODUCTION.

This section contains maintenance information for the Cessna 800 Communication System. It includes removal and replacement procedures, equipment performance tests, and alignment and adjustment procedures. Typical voltage and gain measurements for the receiver-transmitter are shown on Figure 6-1; those for the accessory unit are shown on Figure 6-4. The performance of individual units may be checked by substituting a reliable unit and making a comparative test. Referring to the principles of operation in Section 4 will aid in localizing trouble.

5-2. TEST EQUIPMENT AND ACCESSORIES.

Table 5-1 lists the test equipment and accessories required for maintenance of the Cessna 800 Communication System; equivalent test equipment may be substituted. A regulated low-voltage source is also required.

5-3. REMOVAL AND REPLACEMENT.

General. Parts locations for the receiver-transmitter are shown on Figures 6-2 and 6-3. Parts locations for the accessory unit are shown on Figures 6-5 and 6-6. Exploded views of the control units are shown in Figures 7-1 and 7-2. The receiver-transmitter consists of four individual assemblies and one chassis assembly. These assemblies are visible when the dust cover is removed from the unit. The two subassemblies of A1 are enclosed in a common shield cover which is held with four screws. Except for the replacement of frequency synthesizer A4, no special disassembly procedures are required to remove and replace the receiver-transmitter assemblies.

The accessory unit consists of seven individual assemblies (six in later units, when A4 is omitted) and one chassis assembly. To expose the assemblies of the accessory unit, remove the side panels and re-

TABLE 5-1. TEST EQUIPMENT AND ACCESSORIES

Quantity	Name	Description or Characteristics
	TEST EQUIPMENT	
1	Attenuator, 20 dB	Empire Devices Model AT-70
1	Attenuator, 50 dB	Applied Research Type HFA-50
1	Attenuator, 6 dB	Hewlett-Packard Model 00505B
1	Attenuator, 9 dB	Hewlett-Packard Model 355A*
1	Audio Oscillator	Hewlett-Packard Model 200AB
1	Audio Power Meter	General Radio Type 1840-A
1	Frequency Counter	Hewlett-Packard Model 524C
1	Oscilloscope	Tektronix Model 545B
1	RF Voltmeter	Boonton Electronics Model 91C
1	RF Wattmeter (with 100-250 MHz 25-watt element)	Bird Electronics Thruline Model 43
1	Signal Generator	Hewlett-Packard Model 608D
1	Signal Generator	Measurements Model 65-B
1	Sweep Frequency Generator	Kay Electric Model 159B, with PM7660 head
1	Spectrum Analyzer	Nelson Ross Type NR
1	Voltmeter	Ballantine Model 300D
1	Voltmeter	Hewlett-Packard Model 410B
	ACCESSORIES	
1	Linear Detector	(Fabricate; see Figure 5-3)
1	Contact Removal Tool	Cannon CET-C6B
1	Ammeter	0-5 amperes
1	Capacitor	.01 μF
1	Capacitor	1 μF
1	Capacitor	47 μF
1	Resistor	50 ohms
1	Resistor	100 ohms
1	Resistor	560 ohms
1	Resistor	7500 ohms

*Any fixed 9-dB attenuator may be substituted.

the four screws that secure the heat sink assembly (part of assemblies A1 and A6) to the top of the unit. When the heat sink assembly is lifted aside, all of the assemblies of the accessory unit are accessible.

Replacement of Fuses. The accessory unit includes three fuses which are soldered in the circuit. As shown in Figure 6-6, two fuses, A5F1 and A5F2, are on regulator assembly A5. The other fuse, A8F1, is located on the side of A8J5. To replace any of the fuses, unsolder the defective fuse and solder the replacement fuse in place.

Replacement of Microcircuit Assemblies. Assembly A2 of the receiver-transmitter consists of seven non-repairable microcircuit assemblies and one crystal filter soldered to a printed circuit interconnection board. (See Figure 6-2.) Any of the microcircuit assemblies or the filter may be replaced by unsoldering the defective item and soldering the replacement assembly to the printed circuit board.

The accessory unit contains four microcircuit assemblies (three in later units when A4 is omitted) which are replaceable. One of these is in relay delay assembly A4. Modulator-amplifier assembly A6 contains the other three microcircuit assemblies. (See Figure 6-5.)

CAUTION

Do not remove and replace microcircuit assemblies until adequate circuit measurements have been made to verify that the assembly is defective. Use care when soldering a replacement assembly to the printed circuit board since all microcircuit assemblies include semiconductor devices which may be damaged by improper handling.

Replacement of Frequency Synthesizer. Frequency synthesizer A4 of the receiver-transmitter is a sealed assembly which can be serviced only at factory-designated repair shops. Warranty for the assembly is void if the seal is broken. To replace the frequency synthesizer assembly, see Figure 6-2 and proceed as follows:

Step 1. Remove dust cover from receiver-transmitter; remove two screws from rear cover and remove cover.

Step 2. Remove two screws that hold plate assembly of A3 to rear of chassis.

Step 3. From top side of unit, remove hexagonal post located between assemblies A1 and A2.

Step 4. Through hole in front left-hand corner of the printed circuit board of A2, remove screw and spacer that hold A4.

Step 5. Remove four screws, two from the top and two from the bottom, that hold the receiver-transmitter subassembly to the front of the chassis.

Step 6. Lift receiver-transmitter subassembly away from chassis, disconnecting A3P1 from A5J1.

Step 7. Disconnect A4P3 from A1A2J4.

Step 8. Using Cannon CET-C6B contact removal tool, remove coaxial contact A1 from connector A5J1.

Step 9. Disconnect A5P4 from A4J1.

Step 10. Remove three flat-head screws that hold A4 to the right side plate of the subassembly.

Step 11. Unsolder interconnecting wires and remove frequency synthesizer.

Step 12. To install replacement assembly, refer to Figure 6-2 for wiring information and reverse procedures of Steps 1 through 11.

5-4. GENERAL BENCH TEST INFORMATION.

Interconnection of Units of Cessna 800 Communication System. Bench test cable assemblies (not supplied) must be fabricated to interconnect the units for bench testing. The cable assemblies shown in Figures 5-1 and 5-2 are recommended since they provide convenient test connections. The tests described in this section refer to the use of these cable assemblies.

Interconnection of Cessna 800 Communication System and Test Equipment. Interconnecting cables for the test equipment (when not supplied as test equipment accessories) are fabricated as required from RG-58/U coaxial cable and suitable connectors. A linear detector (see Figure 5-3) also must be fabricated.

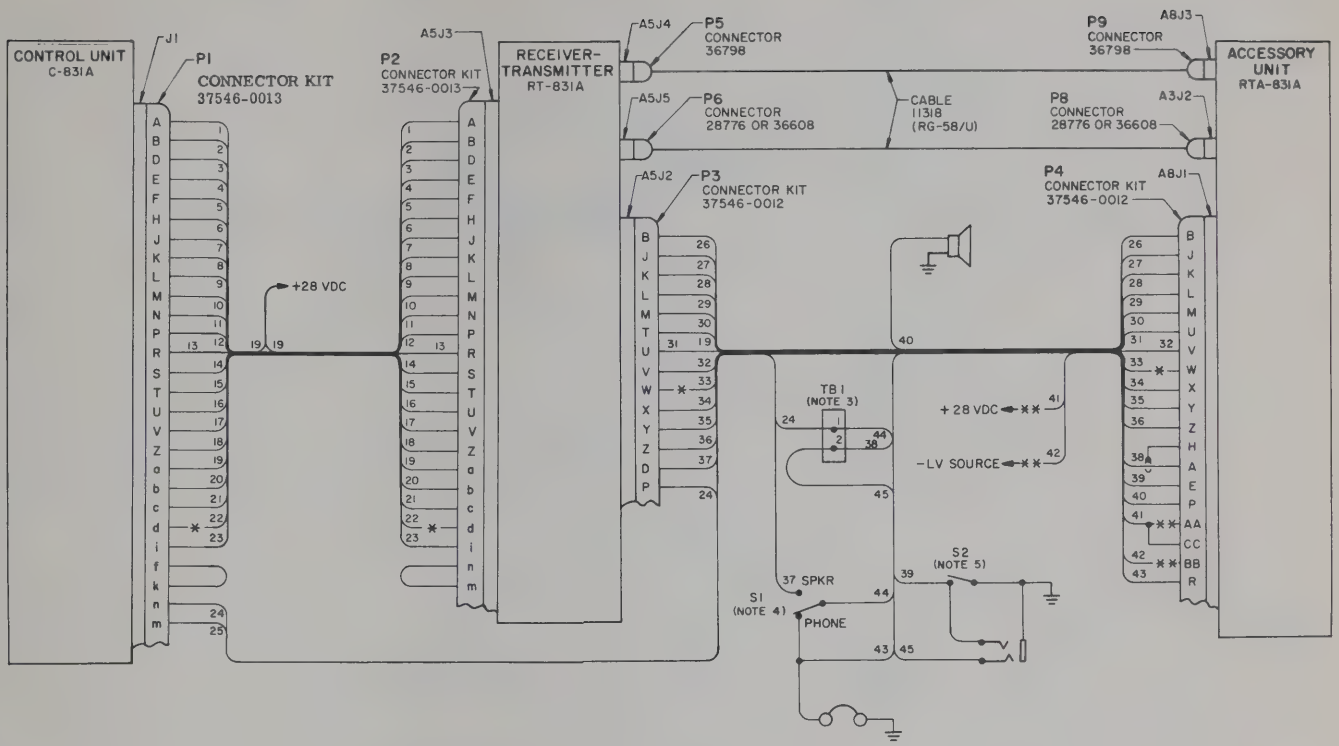
Test Conditions. For bench testing the Cessna 800 Communication System, the following test conditions apply, unless otherwise specified.

Input Power. Input power is 1.5 amperes at 27.5 volts dc for receive and 6.5 amperes at 27.5 volts dc for transmit, supplied from a regulated dc power supply.

Phone Output. Phone output is the audio signal supplied from the receiver through the volume control on the control unit measured across a 250-ohm load.

Signal Generator Output. Use care in connecting the units of the Cessna 800 Communication System and the signal generator to ensure proper interpretation of results. All of the signal generator output-microvolt values given in the procedures in this section are in terms of "hard" (open-circuit) microvolts. * When the Hewlett-Packard 00505B Attenuator (6-dB pad) is used, the attenuator dial of the signal generator reads "hard" microvolts directly. If the signal generator output is connected to the receiver without a 6-dB pad, the attenuator dial reading must be doubled to give the correct "hard" microvolt reading.

* A "hard" microvolt is defined as an equivalent open-circuit microvolt across a 50-ohm signal source when connected to a 50-ohm load.



NOTES:

1. For typical interconnection of cable assemblies, see Figures 5-4 and 5-7.

2. All wires are stranded copper. Unmarked wires are No. 22 AWG. Wires marked with an asterisk (*) are No. 18 AWG. Wires marked with a double asterisk (**) are No. 16 AWG. Shielded wires are No. 22 AWG with insulating jacket.

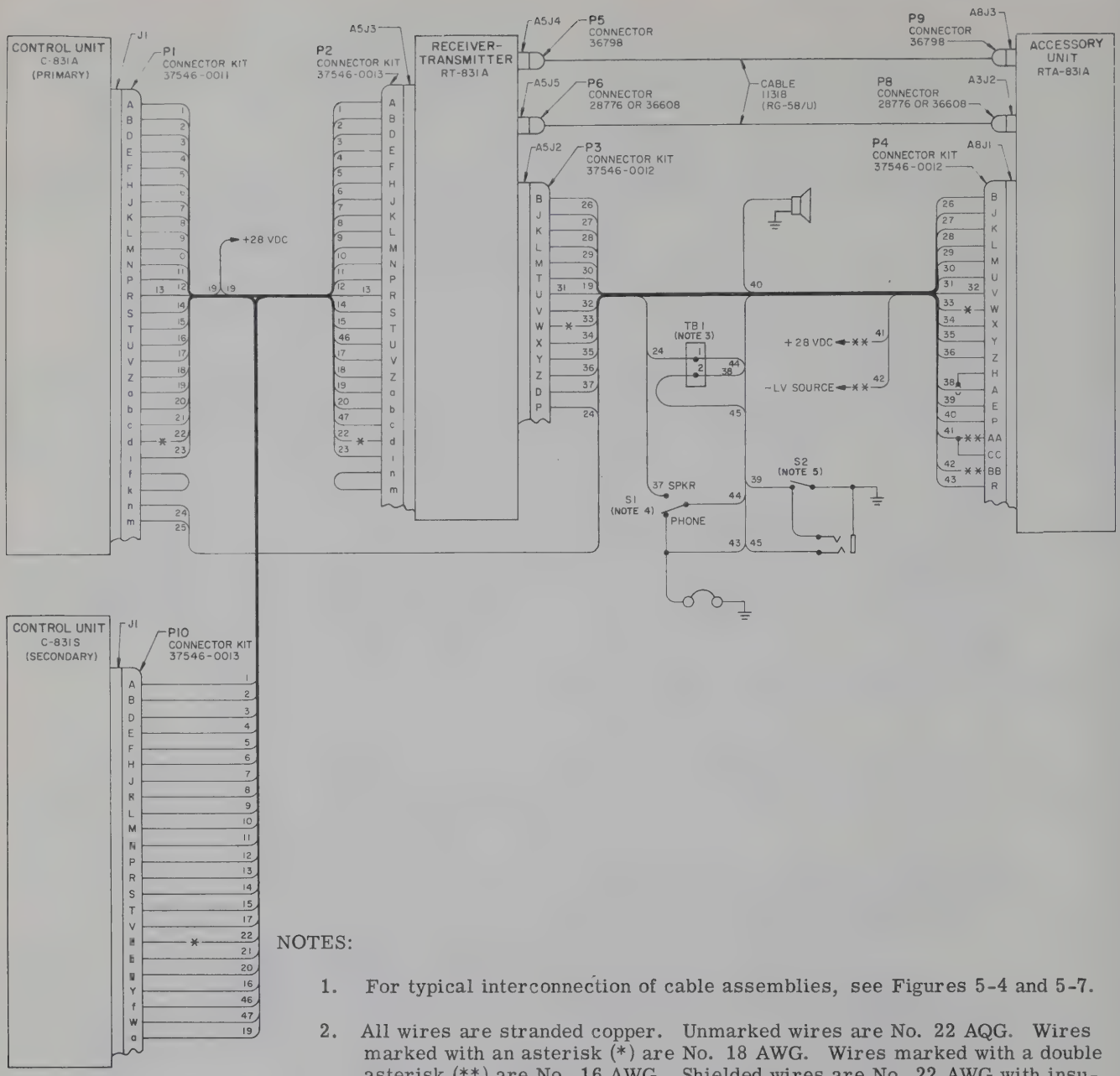
3. Terminals on TB1 provide convenient measurement points:

   Terminal 1 - Input to speaker amplifier
   Terminal 2 - Microphone audio input

4. Switch S1 is a SPDT toggle switch used to select headset or speaker operation.

5. Switch S2 is a SPST toggle switch used for keying transmitter. If the use of a microphone for testing is preferred, attach wires 38 and 39 to microphone jack.

Figure 5-1. Cessna 800 Communication System, Bench Test Cable Assemblies, C-831A Control Unit, Wiring Diagram



NOTES:

1. For typical interconnection of cable assemblies, see Figures 5-4 and 5-7.

2. All wires are stranded copper. Unmarked wires are No. 22 AQG. Wires marked with an asterisk (*) are No. 18 AWG. Wires marked with a double asterisk (**) are No. 16 AWG. Shielded wires are No. 22 AWG with insulating jacket.

3. Terminals on TB1 provide convenient measurement points:

   Terminal 1 - Input to speaker amplifier
   Terminal 2 - Microphone audio input

4. Switch S1 is a SPDT toggle switch used to select headset or speaker operation.

5. Switch S2 is a SPST toggle switch used for keying transmitter. If the use of a microphone for testing is preferred, attach wires 38 and 39 to microphone jack.

Figure 5-2. Cessna 800 Communication System, Bench Test Cable Assemblies; C-831A and C-831S Control Units, Wiring Diagram

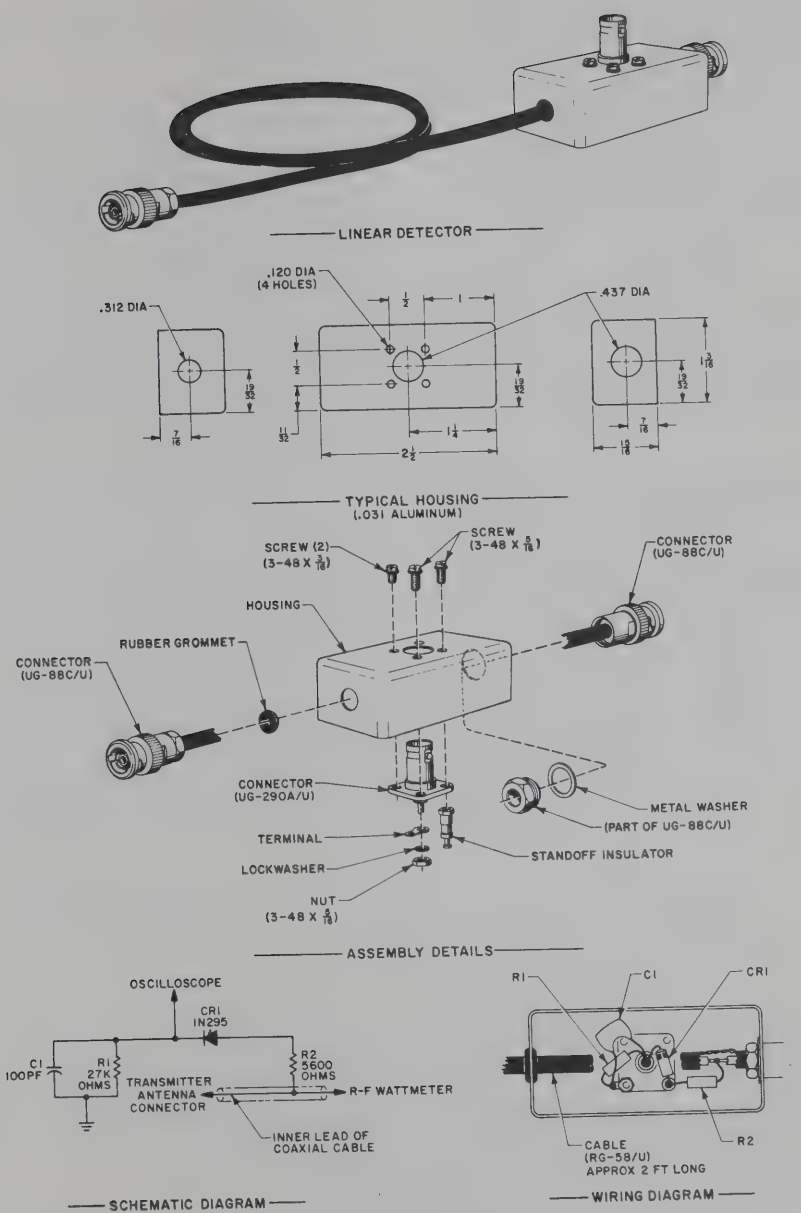


Figure 5-3. Linear Detector for Bench Test Setup

CAUTION

If the transmitter is keyed while a signal generator is connected to antenna connector A8J4 of the accessory unit, the internal impedance resistor in the signal generator will be damaged. To prevent accidental damage to the signal generator during prolonged testing, the signal generator input may be connected directly to receiver RF input A5J1J5 of the receiver-transmitter. However, allowance must be made for the 3-dB signal difference because of the omission of the bandpass filter in the receiver input circuit.

Transmitter Load. During all transmitter testing, the Bird Electronic Model 43 Thruline Wattmeter and Empire Devices Model AT-70 Attenuator (or an equivalent 50-ohm dummy load) must be connected to antenna connector A8J4 of the accessory unit.

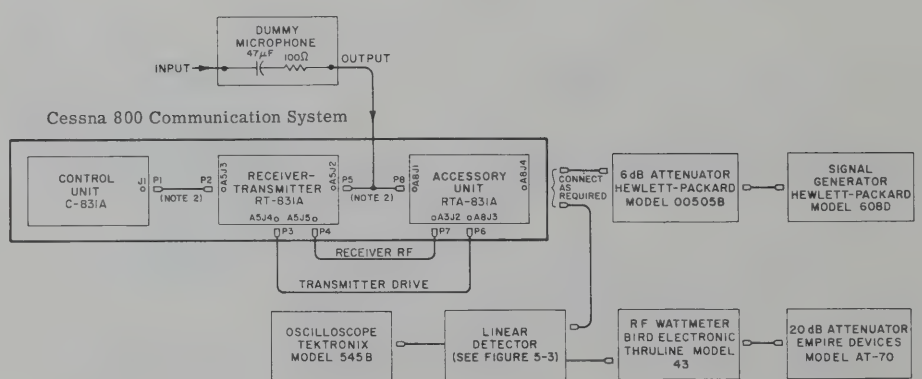
Shield Covers. The two subassemblies of RF assembly A1 of the receiver-transmitter are enclosed in a common shield cover. Removal of the shield cover causes a slight detuning of the RF circuit and causes extensive variation in the balanced mixer output. Access holes are provided in the side plate of the receiver-transmitter subassembly and in the shield cover of A1 for adjusting the balanced mixer circuit. For optimum mixer adjustment, the cover must be in place during adjustments. Transmitter amplifier assembly A1 of the accessory unit is enclosed in a shield cover. The use of a perforated shield cover is recommended during transmitter alignment (paragraph 5-14) but is not absolutely necessary.

5-5. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS.

General. Table 5-2 outlines the procedures for checking performance and troubleshooting the communication set. The tests required to check a circuit are grouped together and identified under a subtitle. The steps of a circuit test should be performed in the order listed as some steps presuppose previous satisfactory results. Primary steps, identified by numerals, must be performed. Secondary steps, identified by an alphanumerical combination, such as 4A, 4B, need not be performed unless an abnormal indication is obtained in the primary step and further testing is required to localize the trouble. This information should be supplemented by referring to the schematic and wiring diagrams in Section 6. The general information in paragraph 5-4 applies to the procedures in Table 5-2.

Test Points. All test points referred to in Table 5-2 are in the receiver-transmitter and the accessory unit. These test points are not stamped on the units; to locate them remove the dust covers from the units and see Figures 5-5 and 5-6.

Voltage Measurements. Voltage values specified in Table 5-2 and on Figures 6-1 and 6-4 are typical and are subject to variation. Controlling factors are the test interconnections, primary input voltage, and selected components in individual units.



NOTES:

1. Equivalent test equipment may be substituted.
2. For bench test cable assemblies see Figures 5-1 and 5-2.
3. Connect all equipment to common ground.

Figure 5-4. Cessna 800 Communication System, General Bench Test Interconnection Diagram

TABLE 5-2. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
	PRELIMINARY PROCEDURE		
1	Interconnect Cessna 800 Communication System components and test equipment as shown in Figure 5-4.	None	-
2	Apply power to test equipment and low-voltage source; allow to warm up. Adjust low-voltage source for 27.5 volts dc output.	-	-
3	Turn on Cessna 800 Communication System.	Panel lamps on control unit light.	Defective switch, panel lamps.
4	Connect dc probe of Hewlett-Packard Model 410B VTVM to terminal C of A3 in receiver-transmitter.	Model 410B indicates 17 ±0.5 volts dc.	Defective 17-volt regulator circuit in accessory unit.
5	Connect dc probe of 410B to red terminal (20 Vdc) on frequency synthesizer in receiver-transmitter.	Model 410B indicates 20 ±0.5 volts dc.	Defective 20-volt regulator circuit in accessory unit.
6	Connect dc probe of 410B to junction of A8R7 and terminal V of A8J1 in acessory unit.	Model 410B indicates 10 ±0.5 volts dc.	Defective resistor A8R7 or fuse A8F1.
7	Connect dc probe of 410B to white terminal (5 Vdc) of frequency synthesizer in receiver-transmitter.	Model 410B indicates 5 ±0.25 volts dc.	Defective 5-volt regulator circuit in A3 of receiver-transmitter.
8	Connect Bird Electronics Model 43 Thruline Wattmeter and 50-ohm load to antenna connector A8J4 of accessory unit.	None	-
9	Connect dc probe of 410B to terminal 5 of modulation transformer A6T1. Key transmitter.	Model 410B indicates 14 volts dc.	Defective 15-volt regulator circuit or transient protector and power switch in A7; defective relay delay assembly A4 (earlier units only); defective keying relay A8K2.
	RECEIVER CIRCUITS		
1	Perform preliminary procedure outlined previously in this table.	As noted.	As noted.
2	Connect Hewlett-Packard Model 608D Signal Generator through Hewlett-Packard Model 00505B Attenuator (6 dB) to antenna connector A8J4 of accessory unit. Set 608D for output signal of 2 μV at 118.000 MHz, with 30 percent modulation of 1000 Hz.	None	-

TABLE 5-2. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS (Continued)

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
	RECEIVER CIRCUITS (Continued)		
3	Set MHz and FRACT MHz controls to 118.000 MHz.	None	-
4	Connect Ballantine Model 300D VTVM to phone output (at speaker-phone switch, see Figure 5-1 or 5-2), and adjust volume control on control unit for an indication of 14 dB on the 1-volt scale of the 300D.	As noted.	-
5	Remove modulation from 608D.	Model 300D indicates drop of at least 6 dB. Drop in output is S+N/N ratio.	Defective or improperly adjusted receiver circuit. To isolate trouble, perform Steps 5A through 5N.
	Turn volume control fully clockwise, reset MHz and FRACT MHz controls to 126.500 MHz, and reset 608D for output signal of 5 μV at 126.500 MHz, with 30 percent modulation of 1000 Hz.	Model 300D indicates 5 volts ac. Note If normal indications are obtained, proceed to Step 6.	Note Advance attenuator of 608D to try to obtain output indication on 300D. If a high level is required to obtain output, check gain of assembly A2 (Steps 5D through 5L). If no output is obtained at any level, check output of frequency synthesizer (Steps 5A and 5B).
5A	Connect probe of Boonton Electronics Model 91C RF Voltmeter to A1A2TP1 (Figure 5-5) of the receiver-transmitter. On control unit, select all receiving frequencies between 118.000 and 135.975 MHz.	Model 91C indicates at least 0.6 volt for each frequency selected.	Defective frequency synthesizer A4.
5B	Disconnect 91C and connect Hewlett-Packard Model 524C Frequency Counter through a .01-μF capacitor to A1A2TP1. Select all receiving frequencies between 118.000 and 135.975 MHz.	Model 524C indicates frequency 21.025 MHz ±0.003 percent greater than selected frequency.	Defective frequency synthesizer A4.
5C	Disconnect 524C.	None	-
5D	Connect Hewlett-Packard Model 200AB Audio Oscillator through a 1-μF capacitor to terminal 14 of assembly A2A7. Set 200AB for output of 20 mV at 1000 Hz.	Model 300D indicates 5 volts ac.	Defective audio amplifier A2A7.
5E	Connect 200AB through 1-μF capacitor to terminal 13 of assembly A2A6, and reset 200AB for output of 53mV at 1000Hz.	Model 300D indicates 5 volts ac.	Defective squelch assembly A2A6. If A2A6 is replaced, IF gain must be readjusted (paragraph 5-11).

TABLE 5-2. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS (Continued)

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
	RECEIVER CIRCUITS (Continued)		
5F	Connect 200AB through 1-μF capacitor to terminal 14 of assembly A2A5; reset 200AB for output of 60 mV at 1000 Hz.	Model 300D indicates 5 volts ac.	Defective audio compressor A2A5.
5G	Connect 200AB through 1-μF capacitor to terminal 6 of assembly A2A4; reset 200AB for output of 480 mV at 1000 Hz.	Model 300D indicates 5 volts ac.	Defective AGC assembly A2A4. If A2A4 is replaced, IF gain adjust A2A1R11 must be readjusted.
5H	Disconnect 200AB, and connect Measurements Model 65-B Signal Generator directly to terminal 14 of assembly A2A3. Set 65-B for output of 270 μV at 4.22 MHz, with 30 percent modulation of 1000 Hz.	Model 300D indicates 5 volts ac.	Defective second IF amplifier A2A3. If A2A3 is replaced, IF gain must be readjusted (paragraph 5-11).
5J	Connect 65-B directly to terminal 6 of assembly A2A1; reset 65-B for output of 65 μV at 23.025 MHz, with 30 percent modulation of 1000 Mz.	Model 300D indicates 5 volts ac.	Defective second mixer A2A2. If A2A2 is replaced, IF gain (paragraph 5-11) must be readjusted.
5K	Connect 65-B directly to terminal 14 of assembly A2A1; reset 65-B for output of 10 μV at 23.025 MHz, with 30 percent Modulation of 1000 Hz.	Model 300D indicates 5 volts ac.	Defective first IF amplifier A2A1. If A2A1 is replaced, IF gain must be readjusted (paragraph 5-11).
5L	Connect 65-B through a 560-ohm resistor to input of A2Z1. Reset 65-B for output of 17 μV at 23.025 MHz, with 30 percent modulation of 1000 Hz.	Model 300D indicates 5 volts ac.	Defective crystal filter A2Z1.
5M	Disconnect 65-B and connect 608D directly to input of A1A2C1 (Figure 5-5). Set 608D for output of 16 μV at 126.500 MHz, with 30 percent modulation of 1000 Hz.	Model 300D indicates 5 volts ac.	Defective or improperly adjusted balanced mixer A1A2 (paragraph 5-10).
5N	Connect 608D through Hewlett-Packard Model 355A Attenuator (9 dB) to receiver RF in A5J5. Set 608D for output of 5 μV at 126.500 MHz, with 30 percent modulation of 1000 Hz.	Model 300D indicates 5 volts ac.	Defective RF amplifier circuit A1A1.
6	Connect 608D through 6 dB attenuator to antenna connector A8J4. Set 608D for output of 3 μV at 126.500 MHz, with 30 percent modulation of 1000 Hz.	None	-
7	Adjust SQUELCH control on the C-831A to mute the receiver. Increase 608D output to 20 μV.	Audio output signal is indicated on 300D.	Defective squelch circuit.
8	Disconnect test equipment.	-	-
	TRANSMITTER CIRCUITS		
1	Perform preliminary procedure outlined previously in this table.	As noted.	As noted.

TABLE 5-2. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS (Continued)

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
	TRANSMITTER CIRCUITS (Continued)		
2	As shown in Figure 5-4, connect Bird Electronic Thruline Model 43 Wattmeter through linear detector to antenna connector A8J4 of accessory unit. Connect Tektronix Model 545B Oscilloscope to side port of linear detector.	-	-
3	Connect Hewlett-Packard Model 200AB Audio Oscillator through dummy microphone to mike audio input (A, A8J1). Adjust 200AB for output of 1000 Hz at 1 volt.	-	-
4	Set MHz and FRACT MHz controls to 118.000, 126.500, and 135.975 MHz succession. Key transmitter at each frequency selected.	Model 43 indicates at least 16 watts for each selected frequency. Model 545B indicates at least 85 percent modulation.	Defective transmitter circuit; to isolate trouble, proceed with steps 5 through 11.
	Increase output of 200AB to 2.5 volts, and recheck transmitter output at 118.000, 126.500, and 135.975 MHz.	Model 545B indicates greater than 85 but not more than 100 percent modulation. Note If normal indications are obtained, disconnect test equipment and omit remaining steps of this procedure.	-
5	Disconnect transmitter drive out cable from A5J4 of the receiver-transmitter and connect a 50-ohm load (50-ohm resistor) across A5J4. Connect Boonton Electronics Model 91C RF Voltmeter across 50-ohm load.	-	-
6	Set MHz and FRACT MHz controls to 118.000, 126.500, and 135.975 MHz in succession. Key transmitter at each frequency selected.	Model 91C indicates at least 0.6 volt for each frequency selected.	Defective frequency synthesizer.
7	Disconnect 91C and 50-ohm load.	-	-
8	In RTA-831A, disconnect A8P2 from A1J3. Readjust 200AB for output of 1 volt at 1000 Hz. Connect General Radio Type 1840-A Audio Power Meter to terminal 5 of audio transformer A6T1. Set A6A1R4 fully clockwise; key transmitter.	Type 1840-A indicates approximately 20 watts.	Defective modulator-amplifier A6.
9	Disconnect 200AB and reconnect A8P2 to A1J3. In succession, connect dc probe of Hewlett-Packard Model 410B VTVM to collector of A1Q1, A1Q2, and A1Q3, keying transmitter at each connection.	Model 410B indicates 13 volts dc.	Defective transistor or circuit component.

TABLE 5-2. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS (Continued)

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
	TRANSMITTER CIRCUITS (Continued)		
10	In succession, connect dc probe of 410B to collector of A1Q4, A1Q5, and A1Q6, keying transmitter at each connection.	Model 410B indicates 14 volts dc.	Defective transistor or circuit component.
11	Disconnect test equipment.	-	-
	MODULATOR-AMPLIFIER CIRCUIT		
1	Perform preliminary procedure, receiver circuit checks, and transmitter circuit checks outlined previously in this table.	As noted.	As noted.
2	Set A8R6 fully clockwise. Connect Hewlett-Packard Model 200AB Audio Oscillator to speaker amplifier in (A8J1, terminal B) of accessory unit. Connect General Radio Type 1840-A Audio Power Meter across 4-ohm speaker. Adjust 200AB for output at 1000 Hz sufficient to produce a 10-watt indication on 1840-A.	As noted.	Defective assembly A6.
3	Connect probe of Ballantine Model 300D VTVM to terminal 8 of audio switch A6A2.	Model 300D indicates approximately 120 mV ac.	Defective wiring in unit.
4	Connect 300D to terminal 2 of A6A2.	Model 300D indicates approximately 110 mV ac.	Defective audio switch A6A2.
5	Connect 300D to base of A6Q1 and then to base of A6Q2.	Model 300D indicates approximately 650 mV ac at each point.	Defective audio amplifier A6A3.
6	Connect 300D to collector of A6Q1 and then to collector of A6Q2.	Model 300D indicates approximately 10 volts ac at each point.	Defective transistor or circuit component.
7	Connect 200AB to mike audio input (A8J1, terminal A); connect 1840-A across terminals 6 and 7 of A6T1. Remove transmitter drive input from connector A8J3, and set A6A1R4 and A6A1R5 fully clockwise. Key transmitter, and adjust 200AB for a 10-watt indication on 1840-A.	As noted.	-
8	Connect 300D to terminal 7 of audio limiter A6A1. Key transmitter.	Model 300D indicates approximately 210 mV ac.	Defective wiring in unit.
9	Connect 300D to terminal 13 of A6A1. Key transmitter.	Model 300D indicates approximately 120 mV ac.	Defective audio limiter A6A1.
10	Connect 300D to terminal 2 of audio switch A6A2. Key transmitter.	Model 300D indicates approximately 120 mV ac.	Defective audio switch A6A2.
11	Connect 300D to base of A6Q1 and then to base of A6Q2. Key transmitter.	Model 300D indicates approximately 650 mV ac at each point.	Defective audio amplifier A6A3.
12.	Connect 300D to collector of A6Q1 and then to collector of A6Q2. Key transmitter.	Model 300D indicates approximately 10 volts ac at each point.	Defective transistor or circuit component.

TABLE 5-2. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS (Continued)

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
	TRANSMITTER CIRCUITS (Continued)		
13	Connect 410B to terminal 5 of A6T1. Key transmitter.	Model 310B indicates approximately 14 volts dc.	Defective transformer A6T1.
14	Refer to paragraph 5-13 and readjust A6A1R4 and A6A1R5.	As noted.	-
15	Disconnect test equipment.	-	-

5-6. GENERAL ALIGNMENT AND ADJUSTMENT INFORMATION.

Paragraph 5-7 describes the measurement and adjustment of the operating voltage outputs in both the receiver-transmitter and the accessory unit. Paragraph 5-8 describes the frequency synthesizer output measurements. The measurements and adjustments of paragraphs 5-7 and 5-8 should be made before any other alignment or adjustment procedures are performed.

Paragraphs 5-9 through 5-12 describe the measurement and adjustment procedures for the other circuits of the receiver-transmitter; Figure 5-5 locates and identifies the adjustment and test points. Paragraphs 5-13 and 5-14 describe the alignment and adjustment procedures for the accessory unit; Figures 5-6 and 5-7 locate and identify the alignment, adjustment, and test points.

The information in paragraph 5-4 applies to all procedures in paragraphs 5-7 through 5-14. After an alignment or adjustment procedure has been completed, equipment performance should be checked as described in paragraph 5-5 and outlined in Table 5-2.

5-7. OPERATING VOLTAGE MEASUREMENTS AND ADJUSTMENTS.

Measure and adjust the operating voltages in the accessory unit and the receiver-transmitter as follows:

Step 1. Interconnect Cessna 800 Communication System components as shown in Figure 5-1 or 5-2 and apply power.

Step 2. Connect dc probe of Hewlett-Packard Model 410B VTVM to emitter circuit of A8Q1 in the accessory unit (Figure 5-6).

Step 3. Adjust A5R7 as necessary to obtain an indication of 20 volts on the 410B.

Step 4. Reconnect dc probe of 410B to emitter circuit of A8Q2.

Step 5. Adjust A4R15 as necessary to obtain an indication of 17 volts on the 410B.

Step 6. Reconnect dc probe of 410B to junction of A8R7 and terminal V of A8J1. The 410B should indicate 10 ±1 volts.

Step 7. Reconnect dc probe of 410B to +5V input of frequency synthesizer A4 in the receiver-transmitter.

Step 8. Adjust A3R8 in the receiver-transmitter as necessary to obtain an indication of 5 ±0.25 volts on 410B.

Step 9. Reconnect dc probe of 410B to terminal 5 of modulation transformer A6T1 of the accessory unit.

Step 10. Key transmitter and adjust A7R13 (Figure 5-6) in the accessory unit as necessary to obtain an indication of 14.5 volts on 410B.

5-8. FREQUENCY SYNTHESIZER A4 OUTPUT MEASUREMENTS.

Before checking and adjusting the other assemblies of the receiver-transmitter and the accessory unit, the outputs of the frequency synthesizer should be checked as follows:

CAUTION

Frequency synthesizer assembly A4 is a sealed unit which has been preadjusted at the factory and must be serviced only at factory-designated repair stations. Warranty is void if seal is broken.

Step 1. Interconnect Cessna 800 Communication System components as shown in Figure 5-1 or 5-2 and apply power.

Step 2. Connect a 50-ohm resistor to transmitter drive out connector A5J4 of the receiver-transmitter. Connect Hewlett-Packard Model 524 Frequency Counter across 50-ohm load.

Step 3. Rotate MHz and FRACT MHz controls from 118.000 to 135.975 MHz, keying transmitter at each frequency selected. Frequency indicated on 524 should be within ±0.003 percent of frequency selected.

Step 4. Through hole in shield cover, connect Boonton Electronics Model 91C RF Voltmeter to A1A2TP1 (Figure 5-5).

Step 5. Rotate MHz and FRACT MHz controls from 118.000 to 135.975 MHz. Check that voltage indicated on 91C is at least 0.6 volt rms for each frequency selected.

Step 6. Disconnect 91C, and reconnect 524 through a .01-μF capacitor to A1A2TP1.

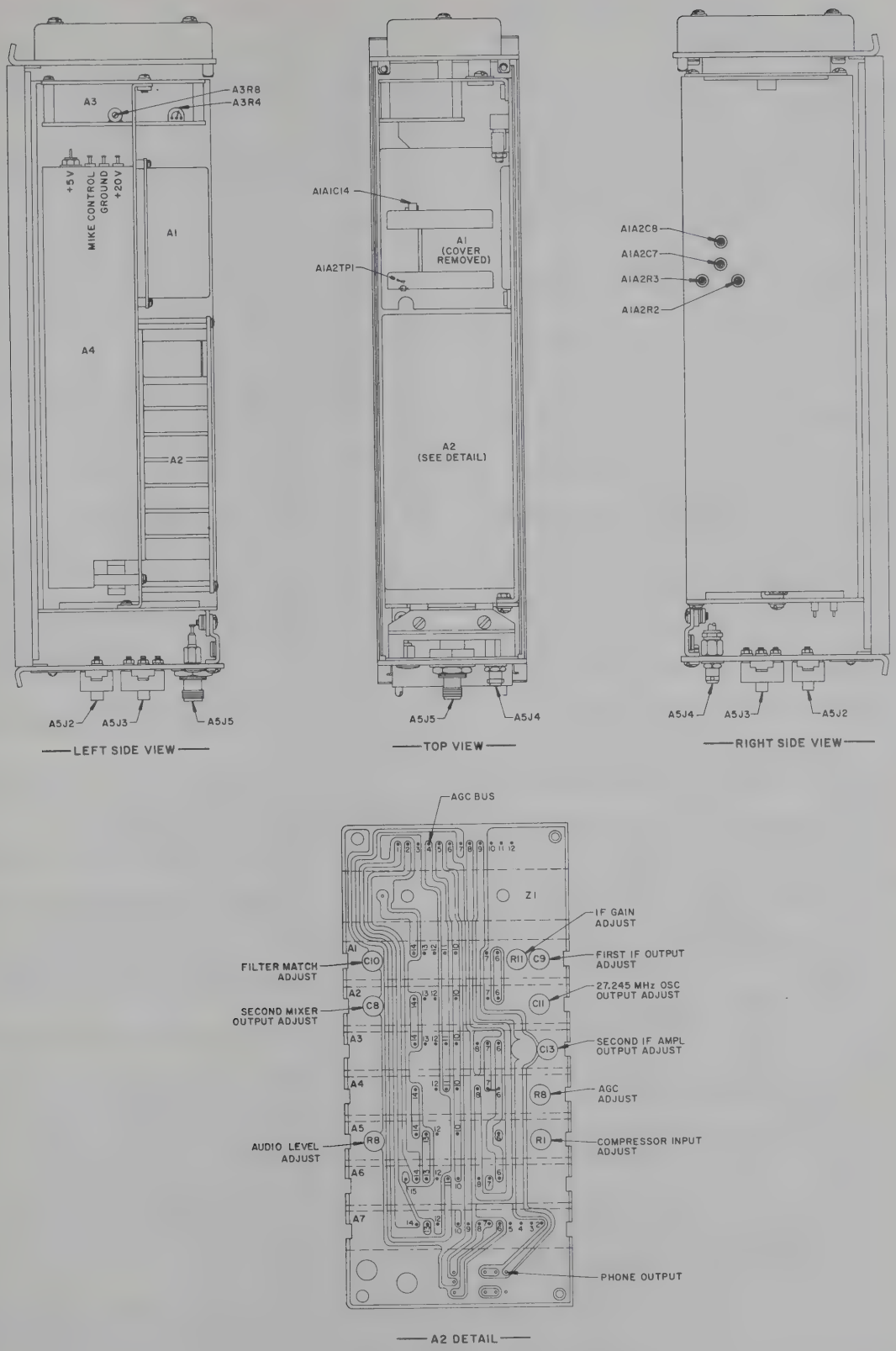


Figure 5-5. RT-831A Receiver-Transmitter, Adjustment and Test Point Location Diagram

Step 7. Rotate MHz and FRACT MHz controls from 118.000 MHz to 135.975 MHz. Frequency indicated on 524 should be 21.025 MHz ±0.003 percent greater than selected frequency.

5-9. ADJUSTMENT OF SECOND MIXER-OSCILLATOR A2A2.

Adjust second mixer-oscillator A2A2 of the receiver-transmitter as follows:

Step 1. Interconnect Cessna 800 Communication System components as shown in Figure 5-1 or 5-2 and apply power.

Step 2. Connect Boonton Electronics Model 91C RF voltmeter to terminal 14 of A2A2 (see Figure 5-5).

Step 3. Adjust 27.245 MHz oscillator output adjust A2A2C11 for maximum output on 91C.

5-10. ADJUSTMENT OF BALANCED MIXER A1A2.

Adjust balanced mixer A1A2 of the receiver-transmitter as follows:

Step 1. Interconnect Cessna 800 Communication System components as shown in Figure 5-1 or 5-2 and apply power.

Step 2. Connect Hewlett-Packard Model 608D Signal Generator output through Hewlett-Packard Model 00505B Attenuator (6 dB) to antenna connector A8J4 of the accessory unit. Adjust 608D for output signal at 126.500 MHz with 30 percent modulation of 1000 Hz.

Step 3. Set MHz and FRACT MHz controls to 126.500 MHz.

Step 4. Connect Ballantine Model 300D VTVM to terminal 6 (detector output) of A2A4 of the receiver-transmitter.

Step 5. Adjust output signal level of 608D to provide an audio output indication on 300D.

Step 6. Through holes in shield cover, adjust A1A2R3 and A1A2C8 for maximum indication on 300D.

Step 7. Reset MHz and FRACT MHz controls to 118.00 MHz and readjust 608D for output signal of 2 μV at 118.000 MHz.

Step 8. Reconnect 300D to phone output (arm of speaker-phone switch) and note output voltage indicated on 300D.

Step 9. Readjust 608D for output signal at 129.513 MHz and increase attenuator setting of 608D by approximately 60 dB.

Step 10. Connect Boonton Electronics 91C RF Voltmeter to A1A2TP1 to monitor frequency synthesizer output.

Step 11. Adjust A1A2R2 and A1A2C7 for minimum indication on 300D (phone output). Make certain that frequency synthesizer output indicated on 91C does not go below 0.6 volt due to adjustment of A1A2R2.

5-11. RECEIVER IF GAIN, AGC, AND SQUELCH ADJUSTMENT.

To adjust the receiver IF gain, AGC, and squelch circuits, proceed as follows:

Step 1. Interconnect Cessna 800 Communication System components as shown in Figure 5-1 or 5-2 and apply power.

Step 2. Connect Hewlett-Packard Model 608D Signal Generator through Hewlett-Packard Model 00505B Attenuator to antenna connector A8J4 of the accessory unit.

Step 3. Set MHz and FRACT MHz controls to 126.500 MHz, and set 608D for output signal at 126.500 MHz with 30 percent modulation of 1000 Hz.

Step 4. Connect Ballantine Model 300D VTVM to detector output (A2A3, terminal 6).

Step 5. In sequence, adjust first IF output adjust A2A1C9, filter match adjust A2A1C10, second mixer output adjust A2A2C8, and second IF amplifier output adjust A2A3C13 for maximum detector output on 300D.

Step 6. Connect dc probe of Hewlett-Packard Model 410B VTVM to AGC bus of Assembly A2 (A2A4, terminal 11).

Step 7. Set attenuator of 608D to 20 μV and adjust IF gain control A2A1R11 until the 410B indicates 3.5 ±0.5 volts.

Step 8. Turn the SQUELCH control on the C-831A fully counterclockwise.

Step 9. Adjust A3R4 until squelch breakthrough is heard on the headset.

Step 10. Vary 608D attenuator from 10 μV to 50,000 μV and check that maximum AGC voltage rise indicated on 410B is not more than 3 dB with no roll back.

5-12. ADJUSTMENT OF AUDIO COMPRESSOR A2A5.

To adjust audio compressor A2A5 of the receiver-transmitter, proceed as follows:

Step 1. Interconnect Cessna 800 Communication System components as shown in Figure 5-1 or 5-2 and apply power.

Step 2. Connect Hewlett-Packard Model 608D Signal Generator through Hewlett-Packard Model 00505B Attenuator to antenna connector A8J4 of the accessory unit. Adjust 608D for output signal of 5 μV at 126.500 MHz with 30 percent modulation of 1000 Hz.

Step 3. Set MHz and FRACT MHz control to 126.500 MHz.

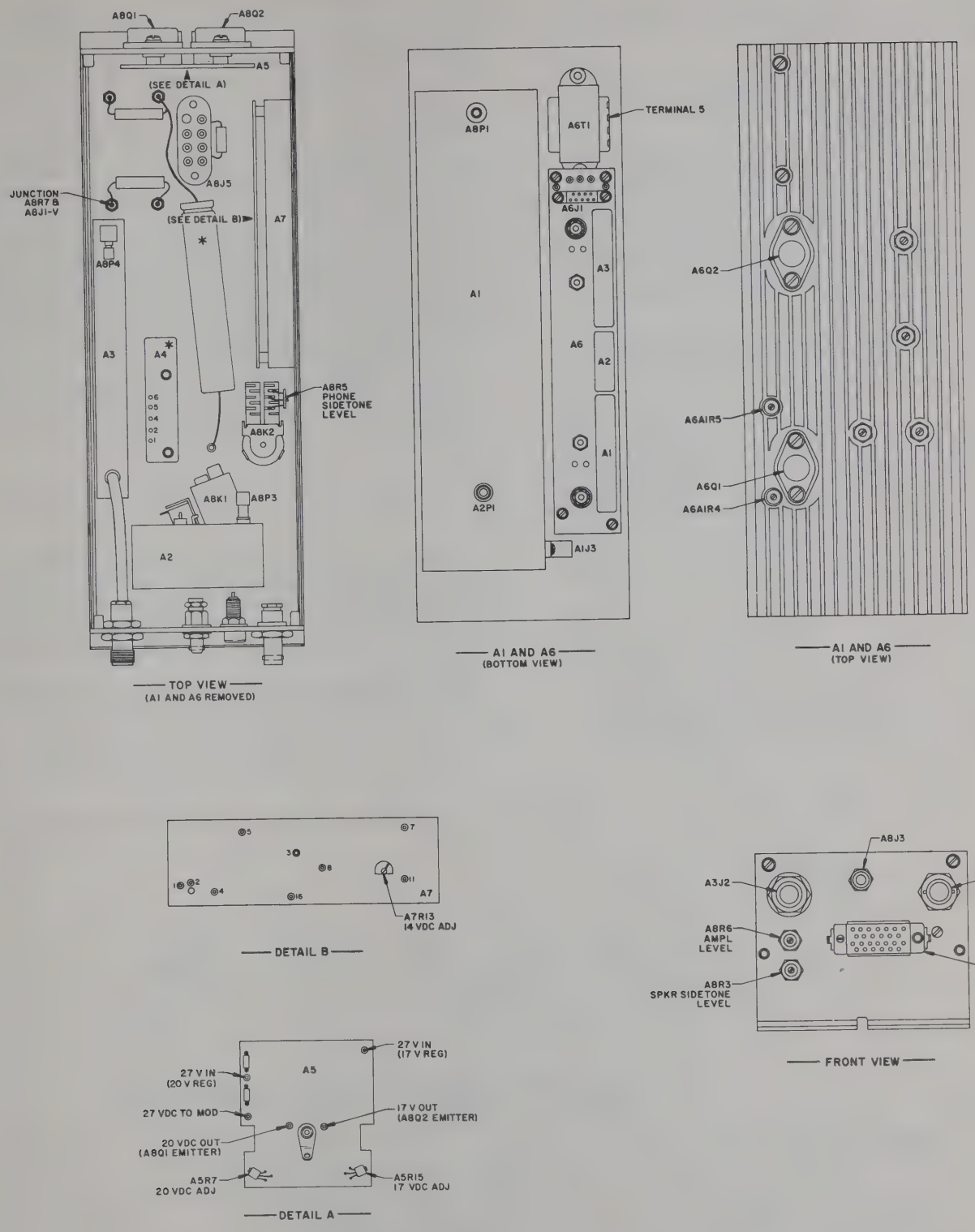
Step 4. Connect Ballantine Model 300D VTVM and Tektronix Model 545B Oscilloscope in parallel across a 250-ohm load (headset) to phone output at speaker-phone switch.

Step 5. Set volume control on control unit fully clockwise and adjust compressor output adjust A2A5R8 for a 5-volt indication of 300D.

Step 6. Increase 608D output signal to 20 μV and adjust volume control on control unit for 3-volt indication on 300D.

Step 7. Increase modulation of 608D signal to 85 percent and adjust compressor input adjust A2A5R1 for phone output on 300D to be 3 dB higher than the 3-volt indication in Step 6. Observe that output waveshape on 545B is not clipped.

Step 8. Reduce output level of 608D to 5 μV with 30 percent modulation and turn volume control on control unit fully clockwise. Phone output indicated



*NOT USED IN ALL UNITS.

Figure 5-6. RTA-831A Accessory Unit, Adjustment and Test Point Location Diagram

on 300D should be 5 volts.

5-13. SPEAKER AMPLIFIER, MODULATOR, AND SIDETONE ADJUSTMENTS.

To adjust the speaker amplifier input, the modulation circuits, and the sidetone circuits in the accessory unit, proceed as follows:

Step 1. Interconnect Cessna 800 Communication System components and test equipment as shown in Figure 5-4. Connect linear detector to A8J4. (Make sure Bird Electronic Model 43 Thruline Wattmeter and 50-ohm load are also connected to linear detector.)

Step 2. Apply power and select 127.000 MHz on MHz and FRACT MHz controls.

Step 3. Turn amplifier level control A8R6 fully clockwise.

Step 4. Connect Hewlett-Packard Model 200AB Audio Oscillator to speaker amplifier input (B, A8J1), and adjust 200AB for output signal of 250 mV at 1000 Hz.

Step 5. Set speaker-phone switch to speaker and connect General Radio Type 1840-A Audio Power Meter across 4-ohm speaker; 1840-A should indicate a minimum of 10 watts.

Step 6. Readjust 200AB for output of 550 mV and adjust A8R6 for 10 watts speaker output on the 1840-A.

Step 7. Reduce output of 200AB to zero and reconnect it through dummy microphone (See Figure 5-4) to mike audio input (A, A8J1).

Step 8. Key transmitter. Power output indicated on Model 43 should be at least 16 watts. Release key.

Step 9. Adjust 200AB for microphone input signal of 1 volt at 1000 Hz through dummy microphone.

Step 10. Key transmitter and check that modulation percentage indicated on Tektronix Model 545B Oscilloscope is at least 85 percent upward modulation. Release key.

Step 11. Readjust 200AB for microphone input signal of 2.5 volts at 1000 Hz, and key transmitter. Modulation percentage indicated on 545B should not exceed 100 percent downward modulation.

Step 12. If necessary, readjust A6A1R5 so that downward modulation does not exceed 100 percent. Release key.

Step 13. On control unit, select frequencies between 118 and 136 MHz. Key transmitter at each frequency selected and check that modulation across the band is greater than 85 percent upward modulation but does not exceed 100 percent downward modulation.

Step 14. With 1840-A still connected across 4-ohm speaker, set speaker-phone switch to speaker and key transmitter. Adjust speaker sidetone level A8R3 for a 200 mW indication on 1840-A.

Step 15. Set speaker-phone switch to phone and connect a headset to phone output.

Step 16. Reconnect 1840-A across headset.

Step 17. Key transmitter and adjust phone sidetone level A8R5 for a 100 mW indication on 1840-A. Release key.

5-14. ALIGNMENT OF TRANSMITTER AMPLIFIER A1.

Transmitter amplifier assembly A1 of the accessory unit will require realignment only when major repairs have been made in the circuit. When any transistor has been replaced, only the discrete transistor circuit should require readjustment. To align A1, proceed as follows:

Step 1. Interconnect Cessna 800 Communication components and test equipment as shown in Figure 5-7.

Step 2. Adjust A1C12, A1C16, A1C17, A1C18,

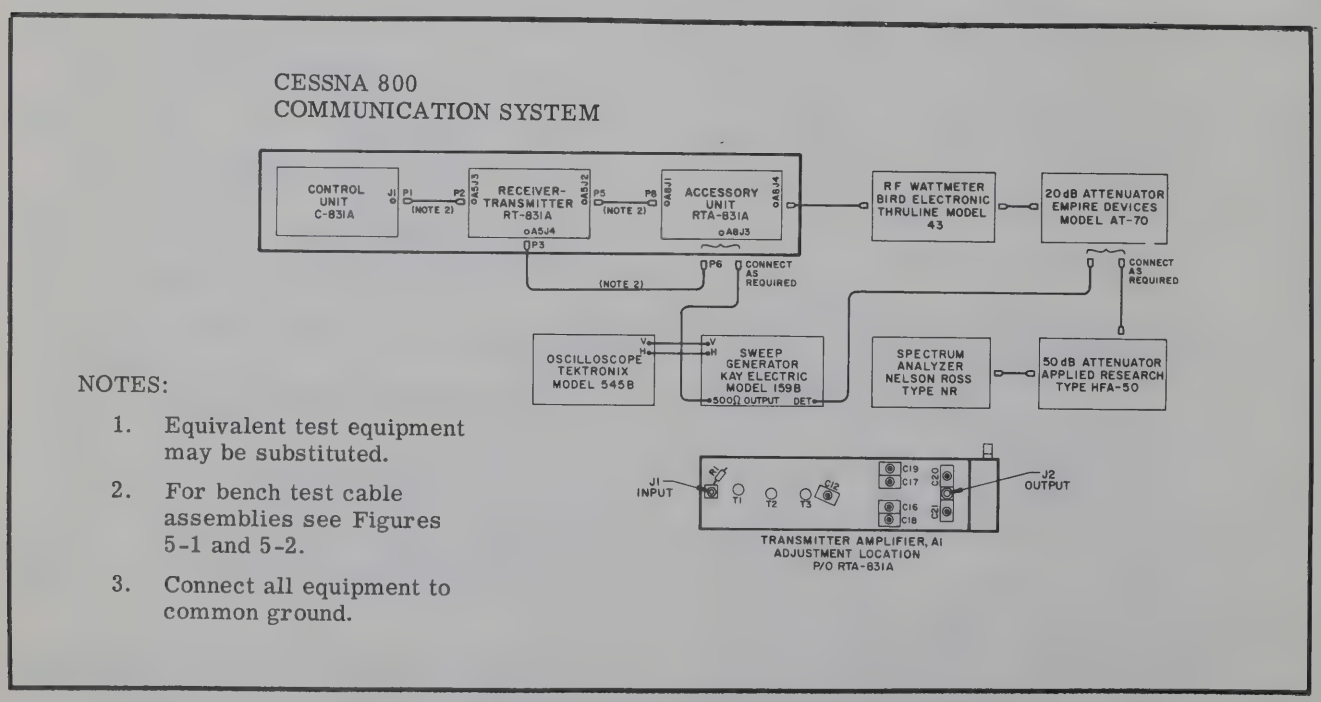


Figure 5-7. Bench Test Interconnection Diagram for Alignment of Transmitter Amplifier A1

A1C20, and A1C21 for maximum capacity (clockwise), then back off one-half turn.

Step 3. Adjust A1T1, A1T2, and A1T3 so that the top of the core is even with the top of the coil form.

Step 4. Select 127.00 MHz on control unit and apply power.

Step 5. Connect Boonton Electronics Model 91C RF Voltmeter to junction of A1J1 and A1R1.

Step 6. Key transmitter and check that input signal to A1 is at least 0.6 volt ac, as indicated on 91C. Disconnect 91C.

Step 7. Observing indication on Bird Electronic Model 43 Thruline Wattmeter, key transmitter and adjust A1C12, A1C16, A1C17, A1C18, A1C19, A1C20, and A1C21 for maximum power output.

Step 8. Disconnect transmitter drive input at A8J3 and connect Kay Electronic Model 159B Sweep Frequency Generator to A8J3. Set 159B to cover range of 118 to 136 MHz. Connect jumper between terminals 4 and 5 of modulation transformer A6T1.

Step 9. Key transmitter and readjust A1C12 and A1C16 - A1C21 for a flat response from 118 to 136 MHz.

solder 15-volt output lead from terminal 11 of A7 (Figure 5-6) and connect 0-5 ampere ammeter between terminal 11 of A7 and 15-volt lead.

Step 11. Key transmitter and check power output on all frequencies between 118 and 136 MHz. Power output on wattmeter should not vary more than 4 watts across the band, and input current on ammeter should not exceed 4 amperes.

Step 12. Remove 0-5 ampere ammeter and resolder 15-volt lead to terminal 11 of A7.

Step 13. Disconnect 159B and reconnect transmitter drive in to A8J3. Disconnect 159B detector lead from Empire Devices Model AT-70 (20 dB) Attenuator, and connect AT-70 output through Applied Research Type HFA-50 Attenuator (50 dB) to Nelson Ross Type NR Spectrum Analyzer.

Step 14. Key transmitter and check for spurious outputs on all frequencies between 118 and 136 MHz. Any spurious output should be at least 60 dB down from the maximum carrier. The only impulse discernable should be a single marker denoting the carrier.

Step 15. Disconnect and remove all test equipment.

SECTION VI

DIAGRAMS

NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation and subassembly designation; for example: A1A1C1, A3C1.

2. For wiring and parts location diagrams, see Figures 6-2 and 6-3.

3. Capacitor values are in microfarads (μF) unless otherwise noted.

4. Inductor values are in microhenries (μH) unless otherwise noted.

5. Transistors A1A2Q1 and A1A2Q2 are matched and must be replaced as a pair.

6. Terminal designations for A2A1-A2A7, A3, and E1-E10 are assigned for reference only; they are not stamped on the assemblies.

7. Q1 is Type A466 in some units.

8. Not used in all units.

9. Conditions for voltage measurements shown in red are as follows:

   a. Voltage measurement only; receive condition, no input signal.

   b. Voltage measurement underlined; receive condition, input signal of 100 μV at 126.500 MHz with 30% modulation of 1000 Hz.

   All measurements are made with a Hewlett-Packard Model 410B VTVM (or equivalent) connected with respect to chassis ground. Units of the set are interconnected as shown in Figures 5-1 or 5-2, all voltages are positive dc unless otherwise noted.

10. Gain measurements shown in red were made under the following conditions:

    a. Equipment connected as shown in Figure 5-1 or 5-2, low-voltage input applied.

    b. RF signal of 5 μV at 126.500 MHz, with 30% modulation of 1000 Hz, applied through a 9-dB attenuator to receiver RF in A5J5 to obtain 5 VAC reference output measured across a 250-ohm load at phone output.

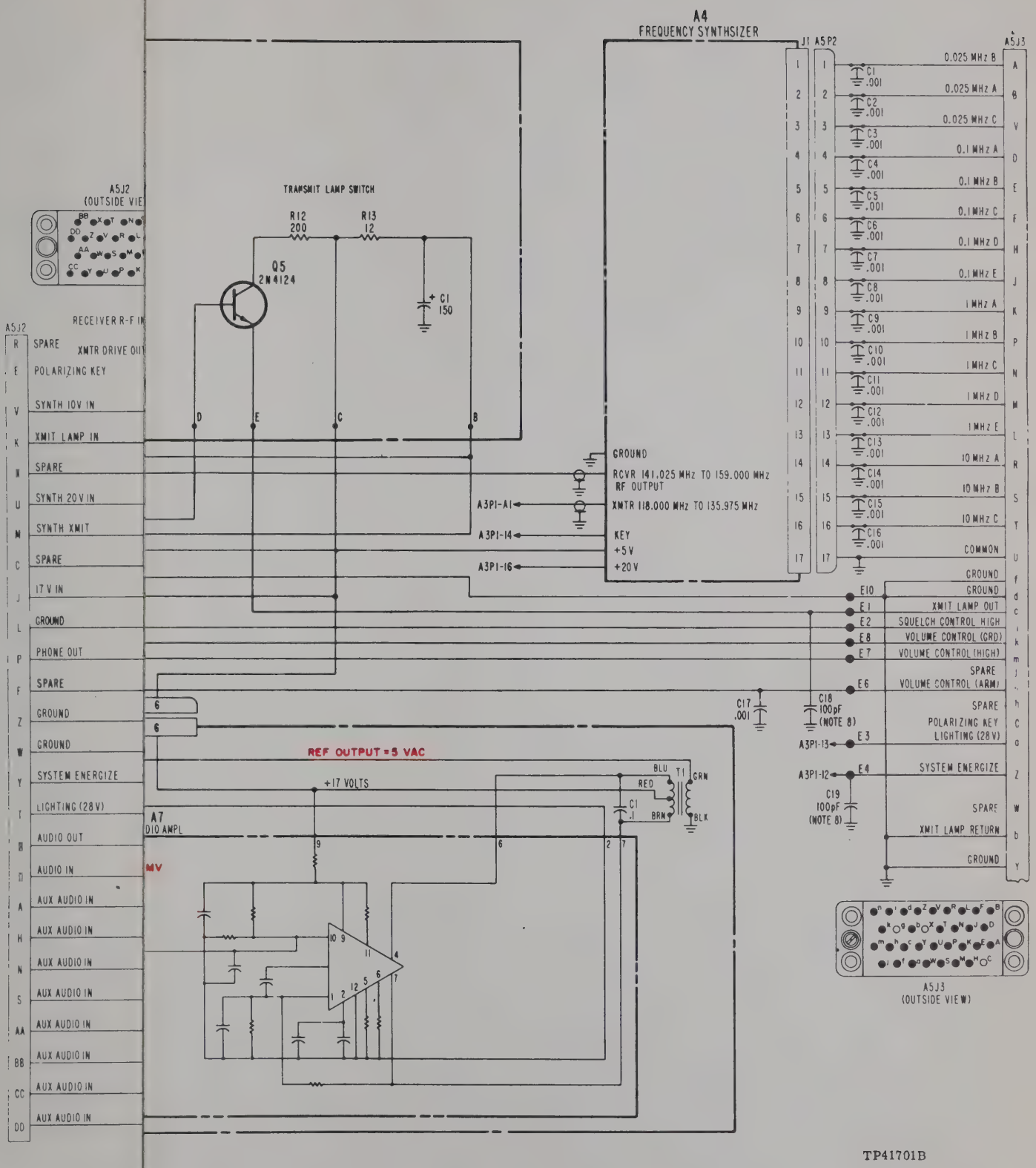


Figure 6-1. RT-831A Receiver-Transmitter, Schematic Diagram

NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation and subassembly designation; for example: A1A1C1, A3C1.

2. For wiring and parts location diagrams, see Figures 6-2 and 6-3.

3. Capacitor values are in microfarads (μF) unless otherwise noted.

4. Inductor values are in microhenries (μH) unless otherwise noted.

5. Transistors A1A2Q1 and A1A2Q2 are matched and must be replaced as a pair.

6. Terminal designations for A2A1-A2A7, A3, and E1-E10 are assigned for reference only; they are not stamped on the assemblies.

7. Q1 is Type A466 in some units.

8. Not used in all units.

9. Conditions for voltage measurements shown in red are as follows:

   a. Voltage measurement only; receive condition, no input signal.

   b. Voltage measurement underlined; receive condition, input signal of 100 μV at 126.500 MHz with 30% modulation of 1000 Hz.

   All measurements are made with a Hewlett-Packard Model 410B VTVM (or equivalent) connected with respect to chassis ground. Units of the set are interconnected as shown in Figures 5-1 or 5-2, all voltages are positive dc unless otherwise noted.

10. Gain measurements shown in red were made under the following conditions:

    a. Equipment connected as shown in Figure 5-1 or 5-2, low-voltage input applied.

    b. RF signal of 5 μV at 126.500 MHz, with 30% modulation of 1000 Hz, applied through a 9-dB attenuator to receiver RF in A5J5 to obtain 5 VAC reference output measured across a 250-ohm load at phone output.

REF. P.-5-13
(TEST + ADJ. LOCATIONS)

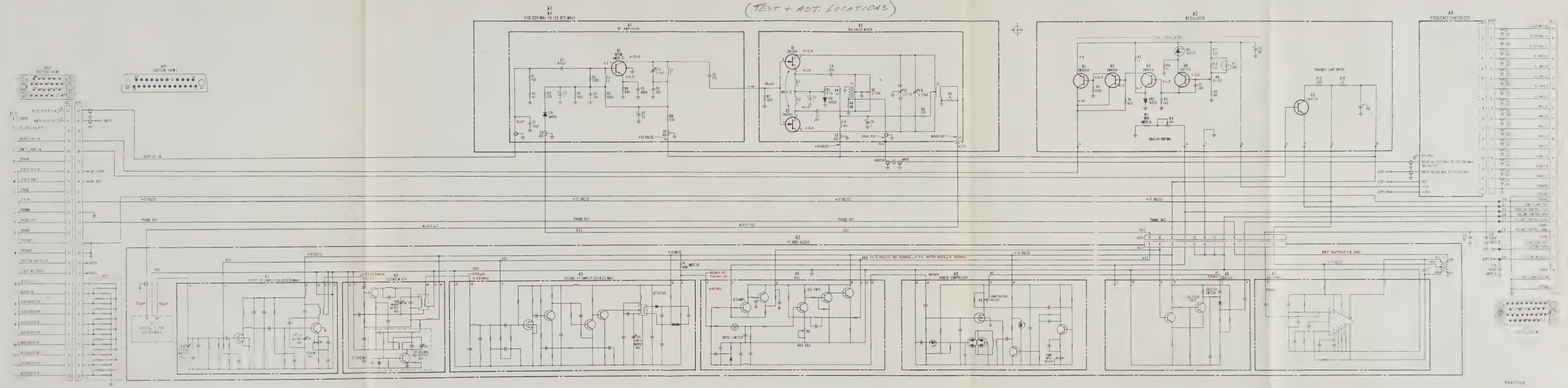
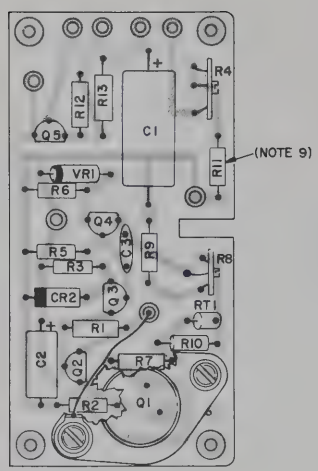
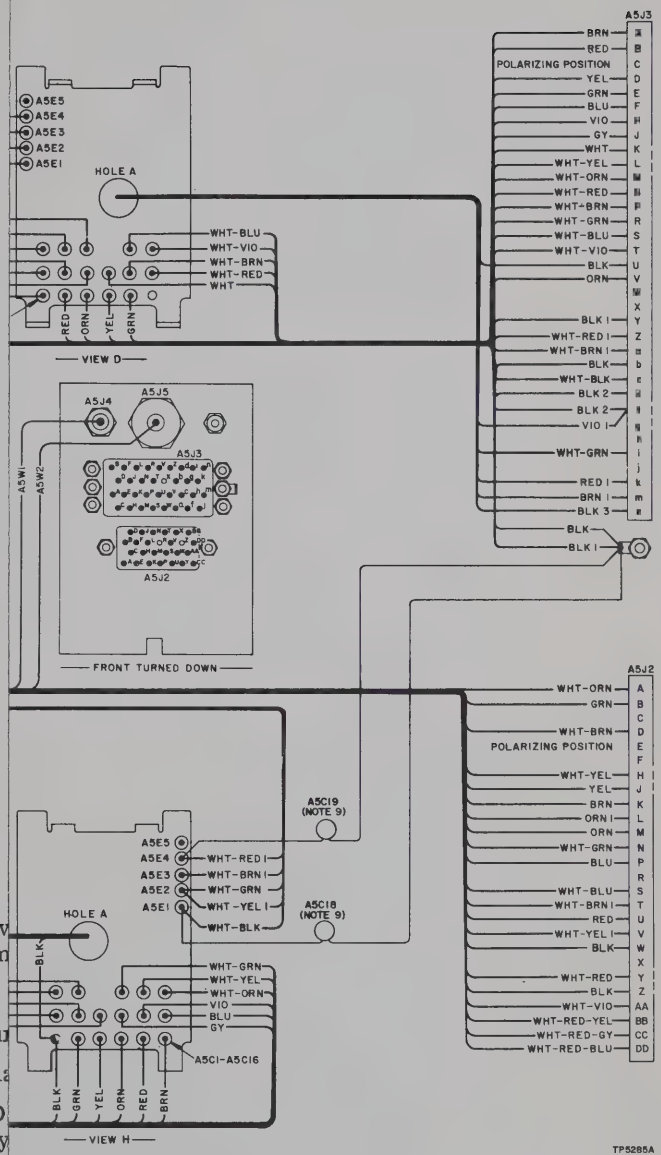


Figure 6-1. RT-831A Receiver-Transmitter, Schematic Diagram

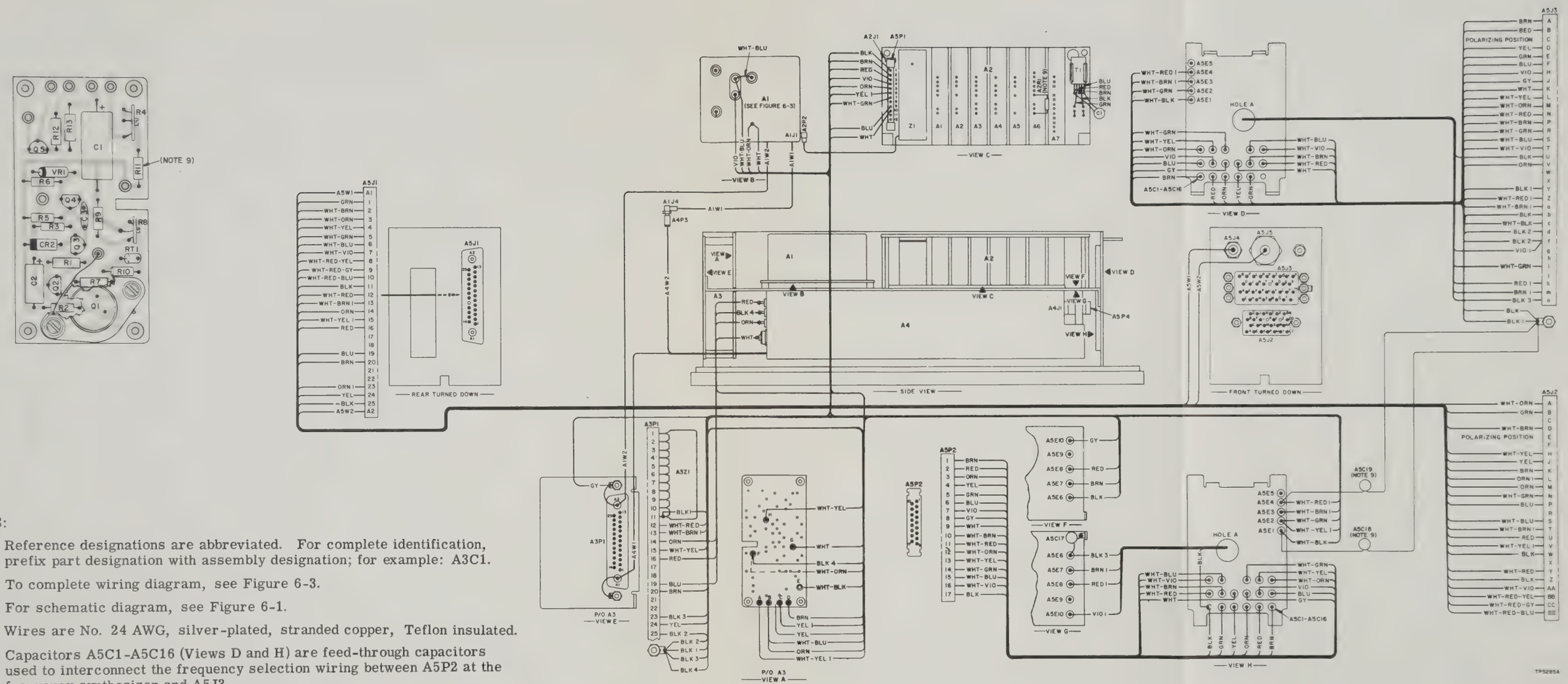




NOTES:

1. Reference designations are abbrev
prefix part designation with assem
2. To complete wiring diagram, see
3. For schematic diagram, see Figu
4. Wires are No. 24 AWG, silver-pl
5. Capacitors A5C1-A5C16 (Views D
used to interconnect the frequency
frequency synthesizer and A5J3.
6. Assemblies A1-A3 and the front a
clarity. For actual locations, see
Except for interconnecting wiring,
shown, since they are not replace
7. Designations for terminals on A3 a
assigned for reference only; they a
8. Shaded area on A3 denotes printed
and unetched copper on opposite si
9. Not used in all units.

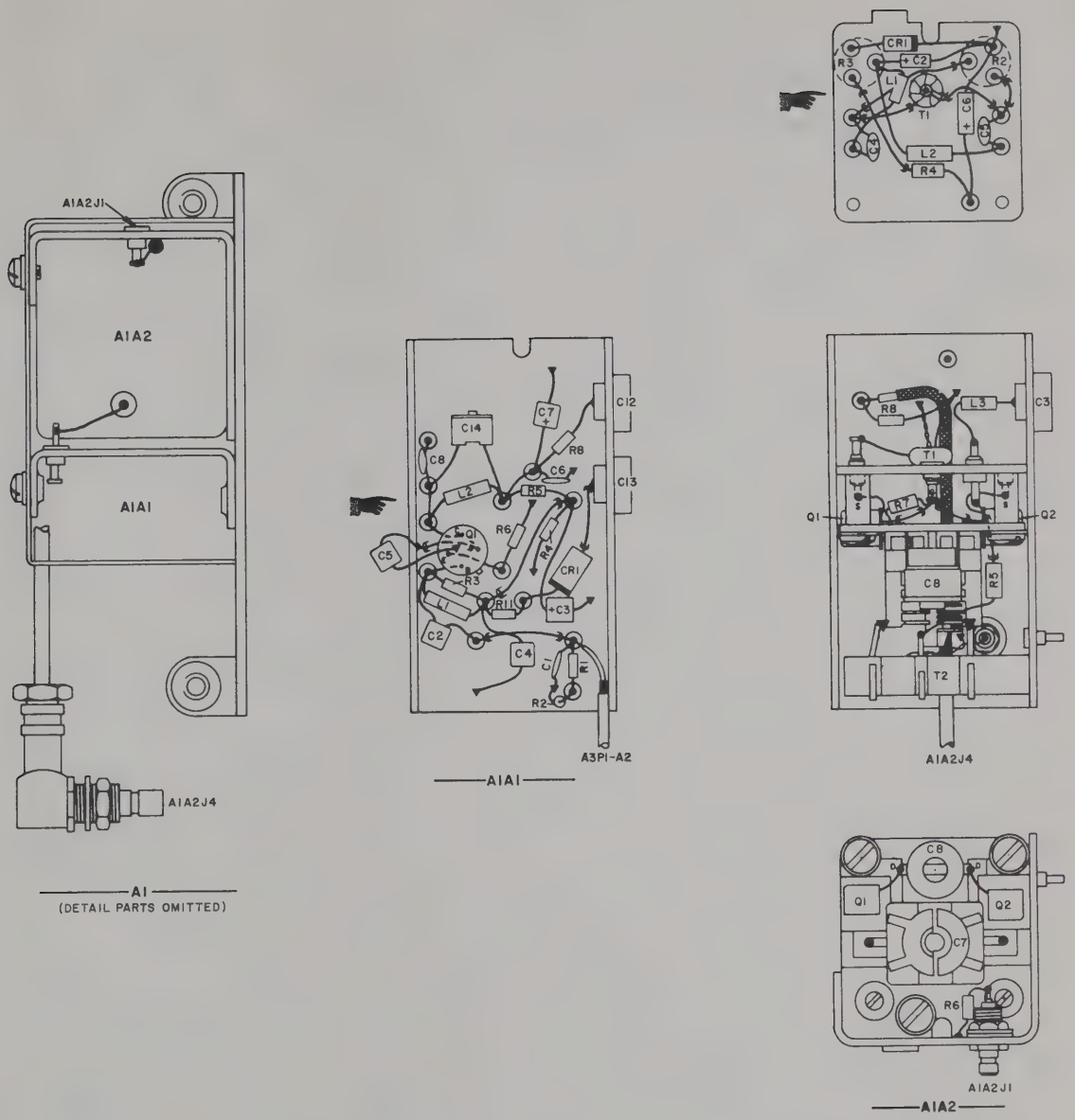
r-Transmitter, Main Wiring Diagram



NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation; for example: A3C1.
2. To complete wiring diagram, see Figure 6-3.
3. For schematic diagram, see Figure 6-1.
4. Wires are No. 24 AWG, silver-plated, stranded copper, Teflon insulated.
5. Capacitors A5C1-A5C16 (Views D and H) are feed-through capacitors used to interconnect the frequency selection wiring between A5P2 at the frequency synthesizer and A5J3.
6. Assemblies A1-A3 and the front and rear plates are displaced for clarity. For actual locations, see location view in center of drawing. Except for interconnecting wiring, parts and wiring for A4 are not shown, since they are not replaceable.
7. Designations for terminals on A3 and for terminals A5E1-A5E10 are assigned for reference only; they are not stamped on the assemblies.
8. Shaded area on A3 denotes printed pattern on component side of broad and unetched copper on opposite side of board.
9. Not used in all units.

Figure 6-2. RT-831A Receiver-Transmitter, Main Wiring Diagram



NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation and subassembly designation; for example: A1A1C1.
2. For main wiring diagram, see Figure 6-2.
3. For schematic diagram, see Figure 6-1.
4. Assembly is shown with shield cover removed; end views of A1A1 and A1A2 are displaced for clarity.

Figure 6-3. RT-831A Receiver-Transmitter, RF Assembly A1, Wiring Diagram

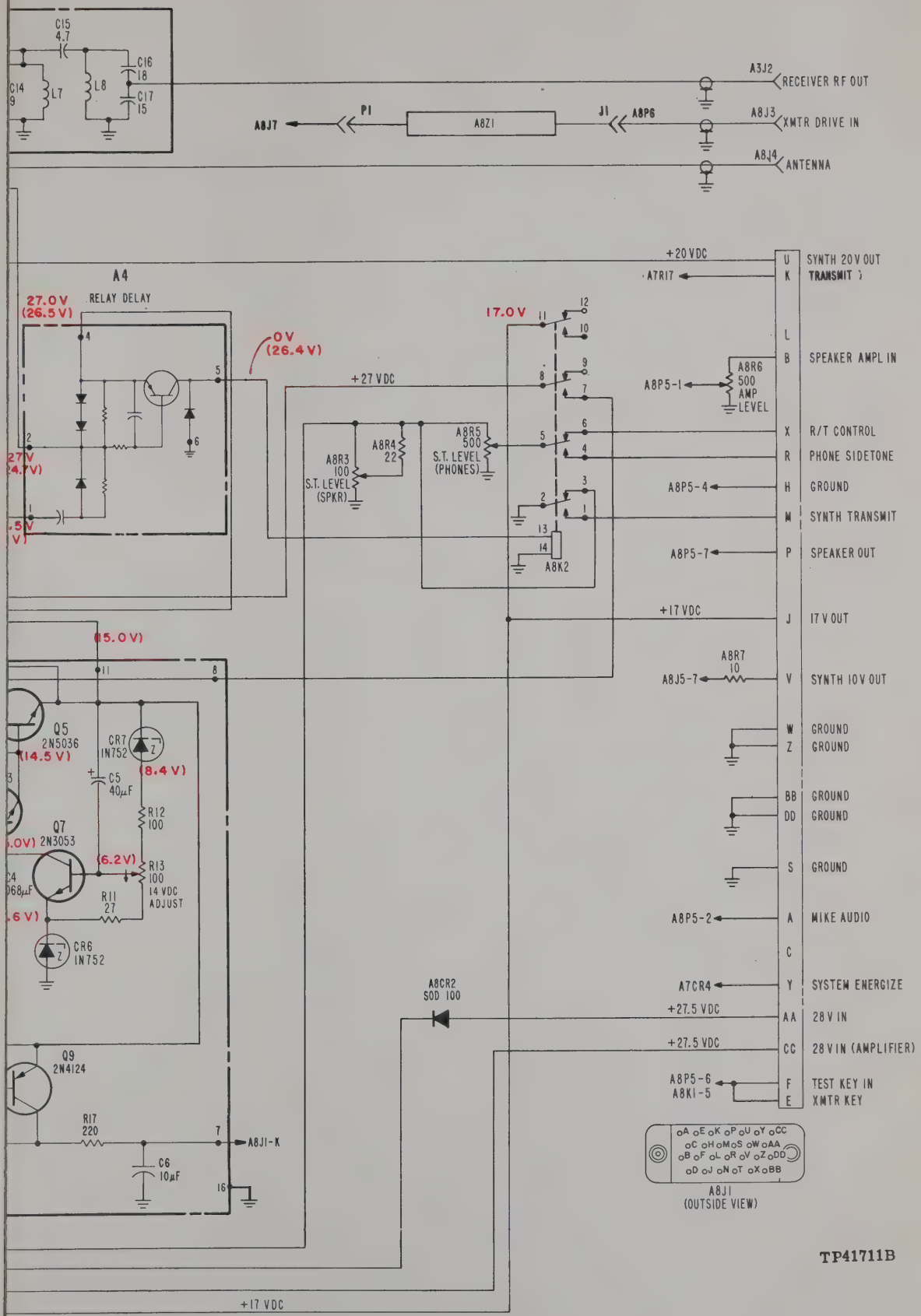


Figure 6-4. RTA-831A Accessory Unit (Original Unit), Schematic Diagram

NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation; for example: A1C1.
2. For wiring diagrams, see Figures 6-5 and 6-6.
3. Capacitor values are in picofarads (pF) unless otherwise noted.
4. Inductor values are in millihenries (mH) unless otherwise noted.
5. Relays A8K1 and A8K2 are shown unenergized.
6. Assemblies A2, A3, A4, A6A1, A6A2, and A6A3 are non-repairable assemblies.
7. Voltage measurements shown in red are typical and are measured with 831A connected as shown in Figures 5-1 or 5-2, with a 50-ohm load connected to antenna connector A8J4, with no signal input. Measurements are made with a Hewlett-Packard Model 410B VTVM (or equivalent) connected with respect to chassis ground. Voltages are positive dc unless otherwise noted. Voltages shown in parentheses are measured with the transmitter keyed.
8. For measuring voltages in transmitter amplifier A1, disconnect A8P1 from A1J1 (transmitter drive input) to prevent high RF fields from affecting voltage indications.

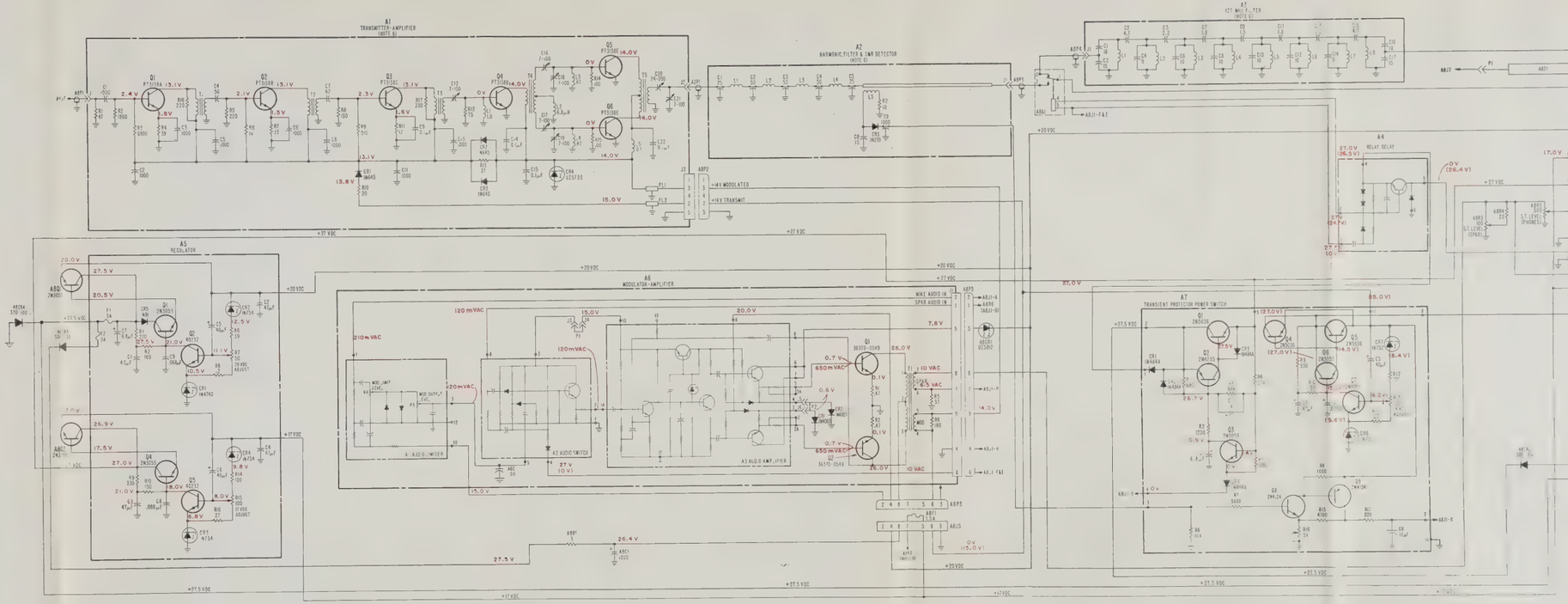
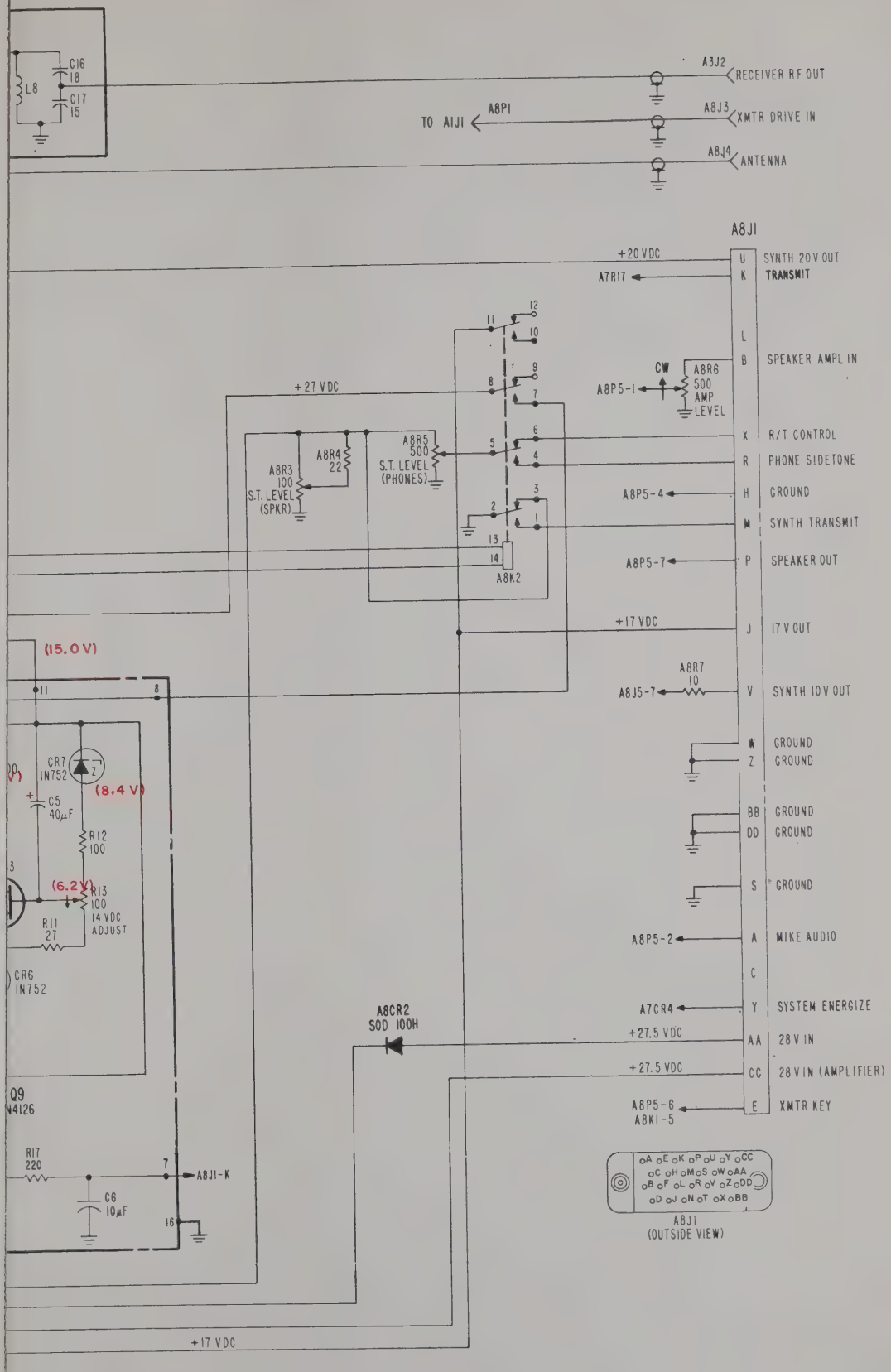


Figure 6-4. RTA-831A Accessory Unit (Original Unit), Schematic Diagram

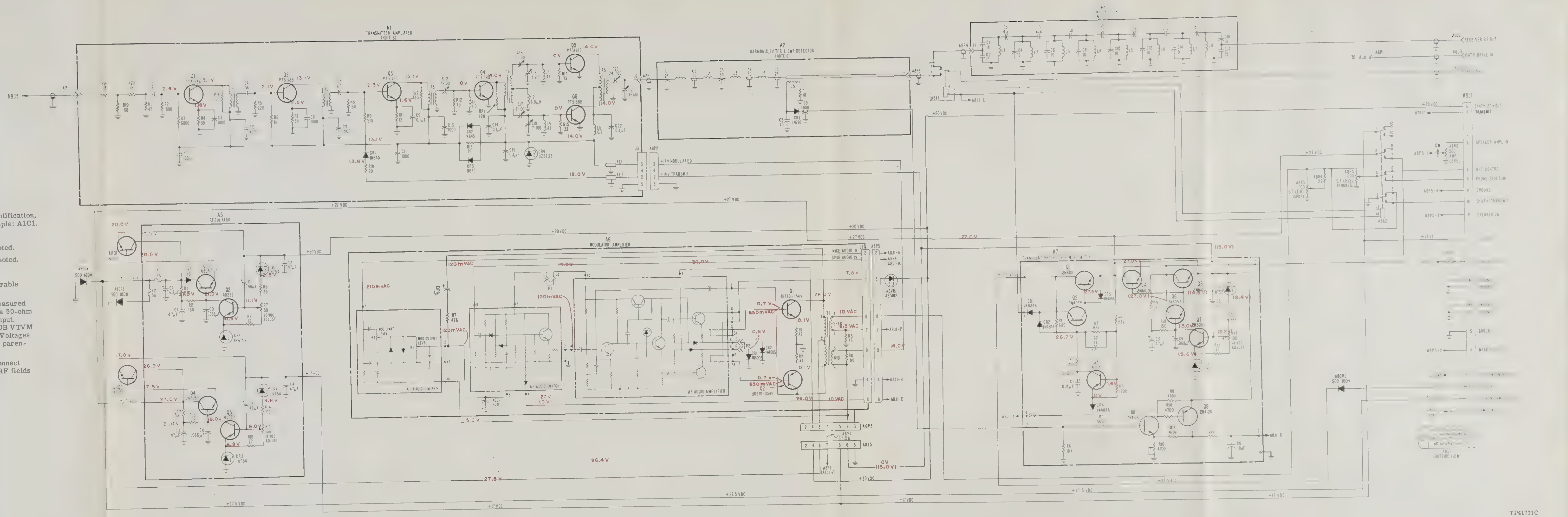


TP41711C

Figure 6-4A. RTA-831A Accessory Unit (Later Unit), Schematic Diagram

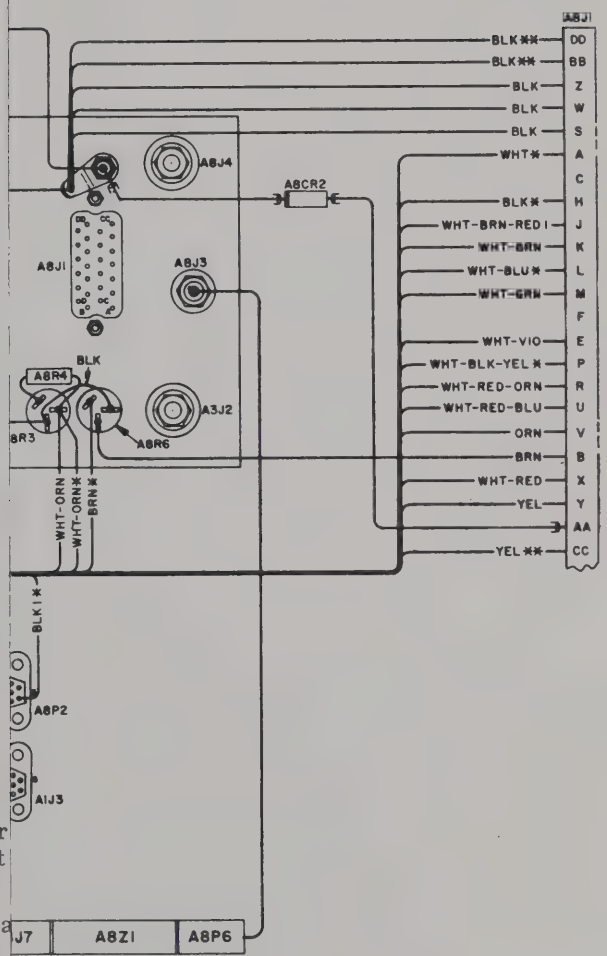
NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation; for example: A1C1.
2. For wiring diagrams, see Figures 6-5A and 6-6.
3. Capacitor values are in picofarads (pF) unless otherwise noted.
4. Inductor values are in millihenries (mH) unless otherwise noted.
5. Relays A8K1 and A8K2 are shown unenergized.
6. Assemblies A2, A3, A6A1, A6A2, and A6A3 are non-repairable assemblies.
7. Voltage measurements shown in red are typical and are measured with 831A connected as shown in Figures 5-1 or 5-2, with a 50-ohm load connected to antenna connector A8J4, with no signal input. Measurements are made with a Hewlett-Packard Model 410B VTVM (or equivalent) connected with respect to chassis ground. Voltages are positive dc unless otherwise noted. Voltages shown in parentheses are measured with the transmitter keyed.
8. For measuring voltages in transmitter amplifier A1, disconnect A8P1 from A1J1 (transmitter drive input) to prevent high RF fields from affecting voltage indications.



TP41711C

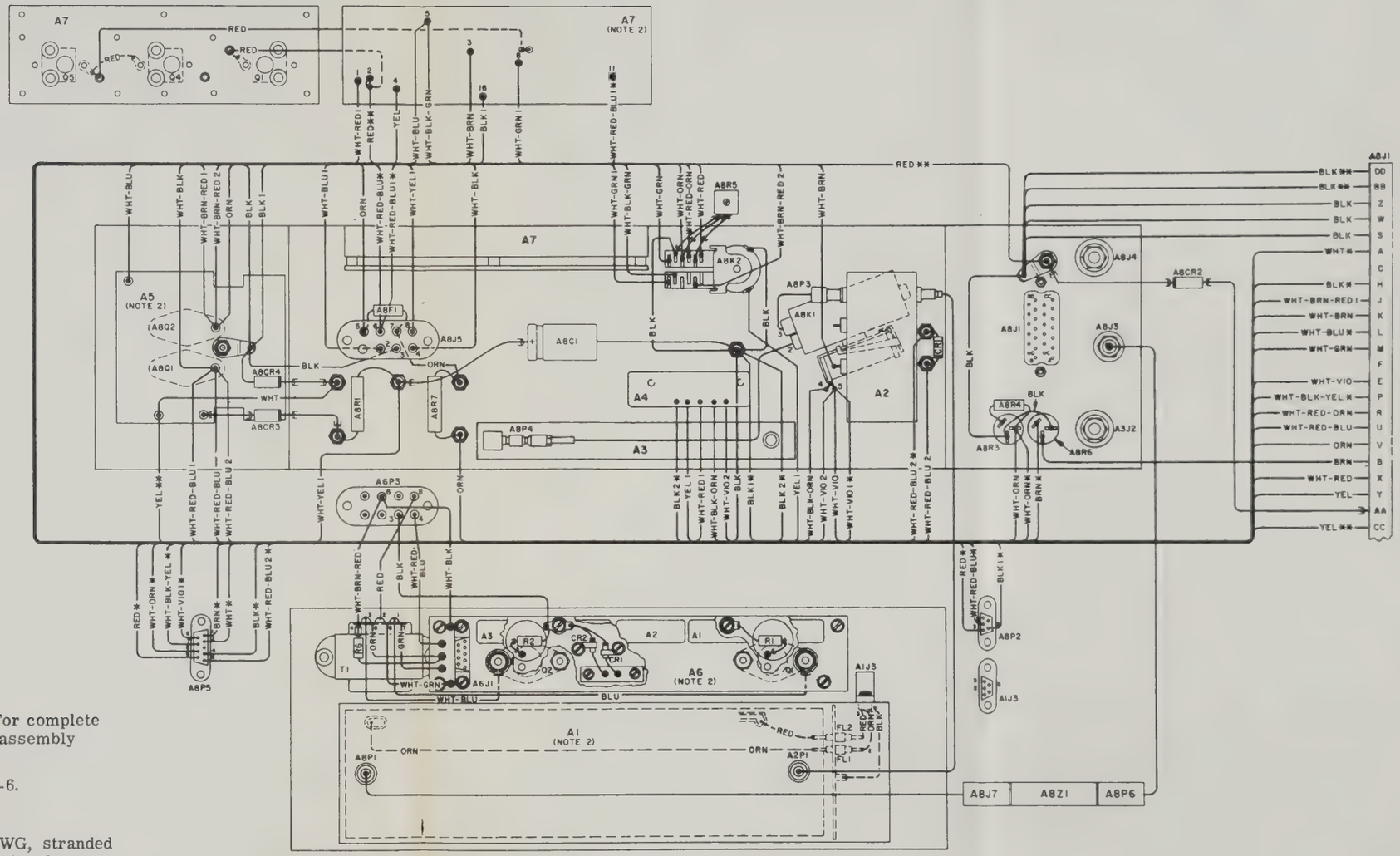
Figure 6-4A. RTA-831A Accessory Unit (Later Unit), Schematic Diagram



NOTES:

1. Reference designations ar identification, prefix part designation; for example:
2. To complete wiring diagra
3. For schematic diagram, s
4. Wires marked with color r copper, Teflon insulated. and an asterisk (*) are No. Teflon insulated. Wires n double asterisk (**) are N Teflon insulated.
5. Front and back ends of cha turned down and assemblie displaced for clarity.
6. Assemblies A2, A3, and A repairable and must be re

Unit (Original Units), Main Wiring Diagram



NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation; for example: A8C1, A6A1.
2. To complete wiring diagram, see Figure 6-6.
3. For schematic diagram, see Figure 6-4.
4. Wires marked with color note are No. 22 AWG, stranded copper, Teflon insulated. Wires marked with color note and an asterisk (*) are No. 24 AWG, stranded copper, Teflon insulated. Wires marked with color note and double asterisk (**) are No. 18 AWG, stranded copper, Teflon insulated.
5. Front and back ends of chassis and assembly A5 are turned down and assemblies A1, A6, and A7 are displaced for clarity.
6. Assemblies A2, A3, and A4 and relay A8K1 are not repairable and must be replaced as an assembly.

Figure 6-5. RTA-831A Accessory Unit (Original Units), Main Wiring Diagram

NOTES:

1. Reference designations are abbreviated. identification, prefix part designation wit designation; for example: A8K1, A6A1.

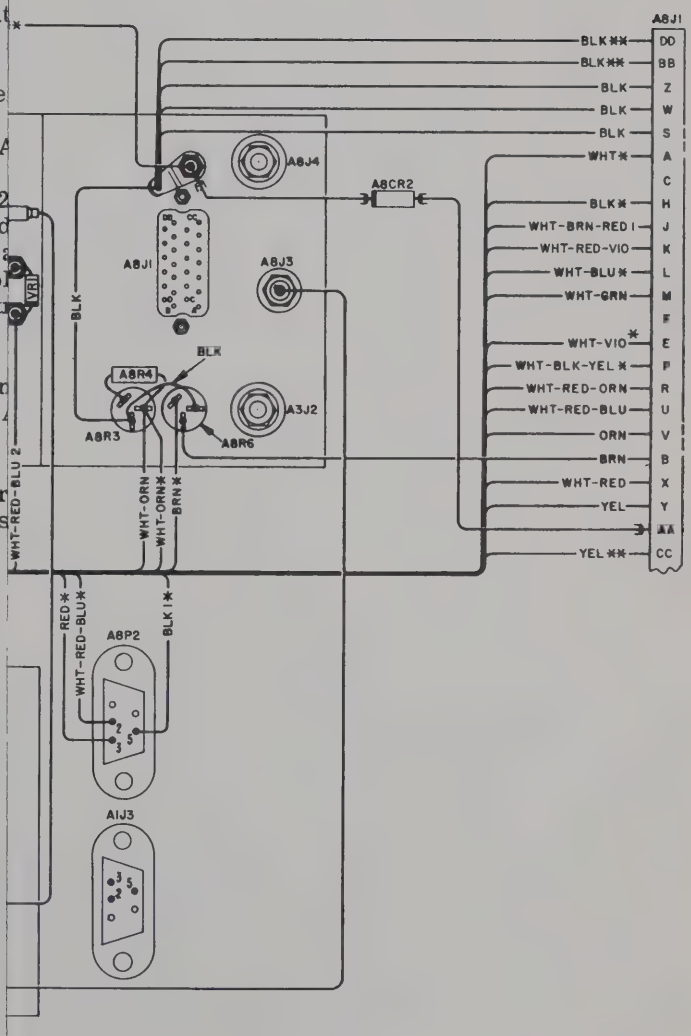
2. To complete wiring diagram, see Figure

3. For schematic diagram, see Figure 6-4A

4. Wires marked with color note are No. 22 copper, Teflon insulated. Wires marked and an asterisk (*) are No. 24 AWG, str Teflon insulated. Wires marked with co double asterisk (**) are No. 18 AWG, st Teflon insulated.

5. Front and back ends of chassis and assen turned down and assemblies A1, A6 and displaced for clarity.

6. Assemblies A2 and A3 and relay A8K1 ar repairable and must be replaced as an as



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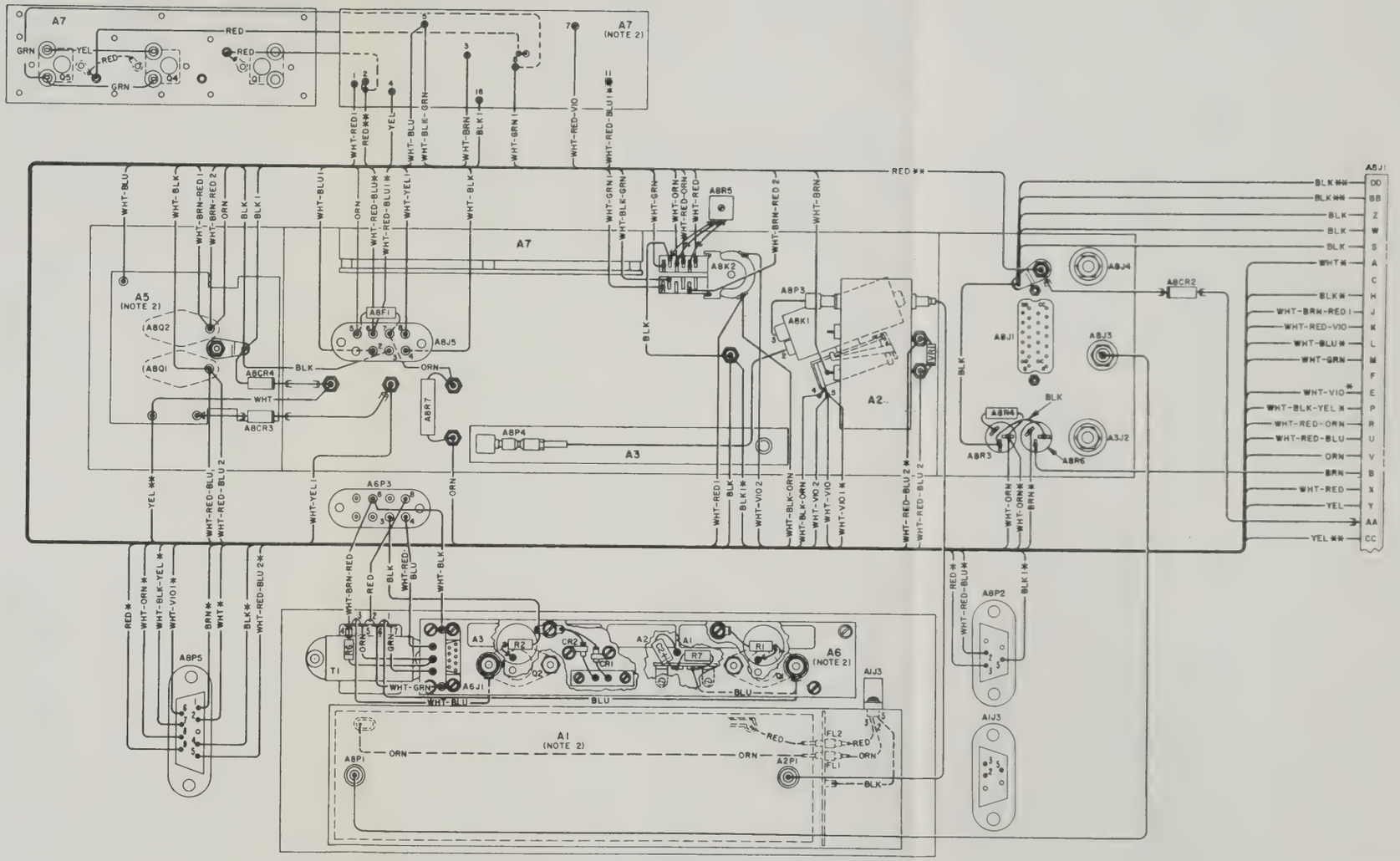
A Accessory Unit (Later Units), Wiring Diagram

NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation; for example: A8K1, A6A1.
2. To complete wiring diagram, see Figure 6-6.
3. For schematic diagram, see Figure 6-4A.
4. Wires marked with color note are No. 22 AWG, stranded copper, Teflon insulated. Wires marked with color note and an asterisk (*) are No. 24 AWG, stranded copper, Teflon insulated. Wires marked with color note and double asterisk (**) are No. 18 AWG, stranded copper, Teflon insulated.
5. Front and back ends of chassis and assembly A5 are turned down and assemblies A1, A6 and A7 are displaced for clarity.
6. Assemblies A2 and A3 and relay A8K1 are not repairable and must be replaced as an assembly.



TP5591A

Figure 6-5A. RTA-831A Accessory Unit (Later Units), Wiring Diagram

NOT

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2.

3.

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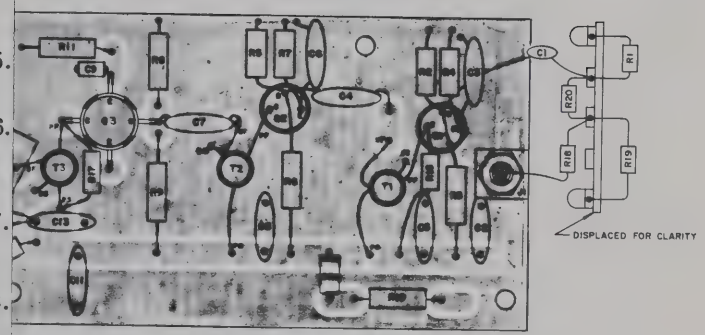
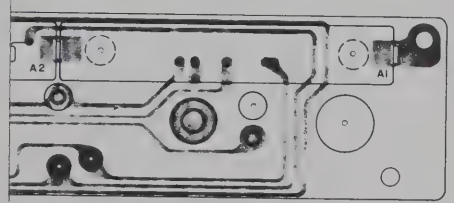
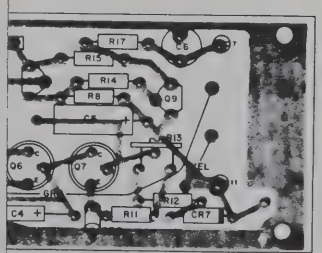
7.

8.

9.





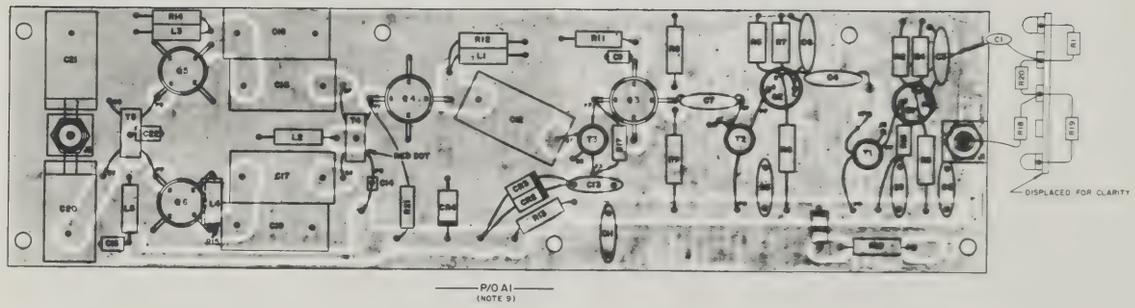


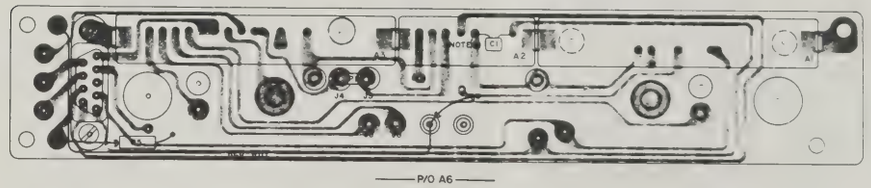
TP4961C

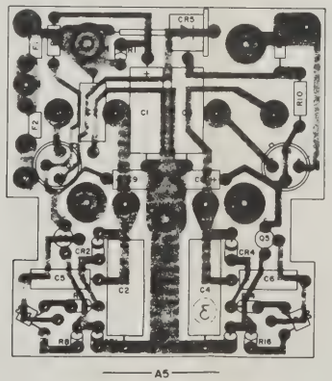
blies A1, A5, A6 and A7, Wiring Diagram

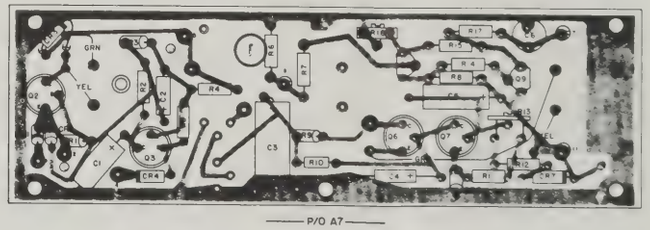
NOTES:

1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation; for example: A1C1.
2. For main wiring diagram, see Figure 6-5 or 6-5A.
3. For schematic diagram, see Figure 6-4 or 6-4A.
4. Shaded area denotes printed pattern on component side of board and unetched copper on opposite side of board.
5. Assembly A1 is shown with shield cover removed.
6. Assemblies A6A1, A6A2, and A6A3 are not repairable and must be replaced as assemblies.
7. To complete assemblies A6 and A7, see Figure 6-5 or 6-5A.
8. Not used in original units.
9. Assembly shown is for later production units. In original units, C1 is connected between J1 and the base of Q1; R1 is connected between J1 and ground; R18, R19, R20, and R21 are not used.







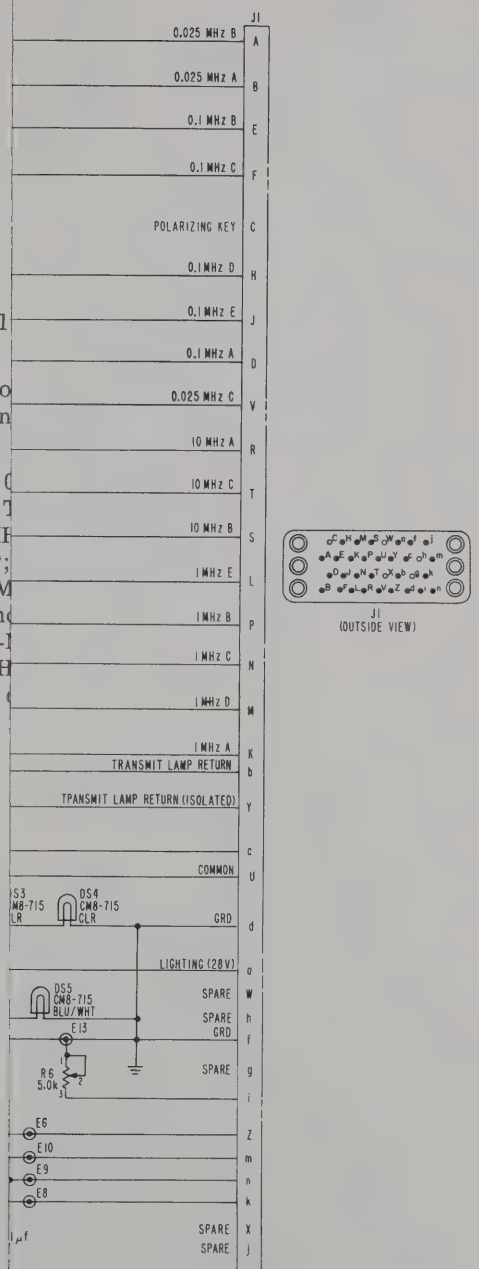


TP4961C

Figure 6-6. RTA-831A Accessory Unit, Printed Circuit Boards for Assemblies A1, A5, A6 and A7, Wiring Diagram

NOTES:

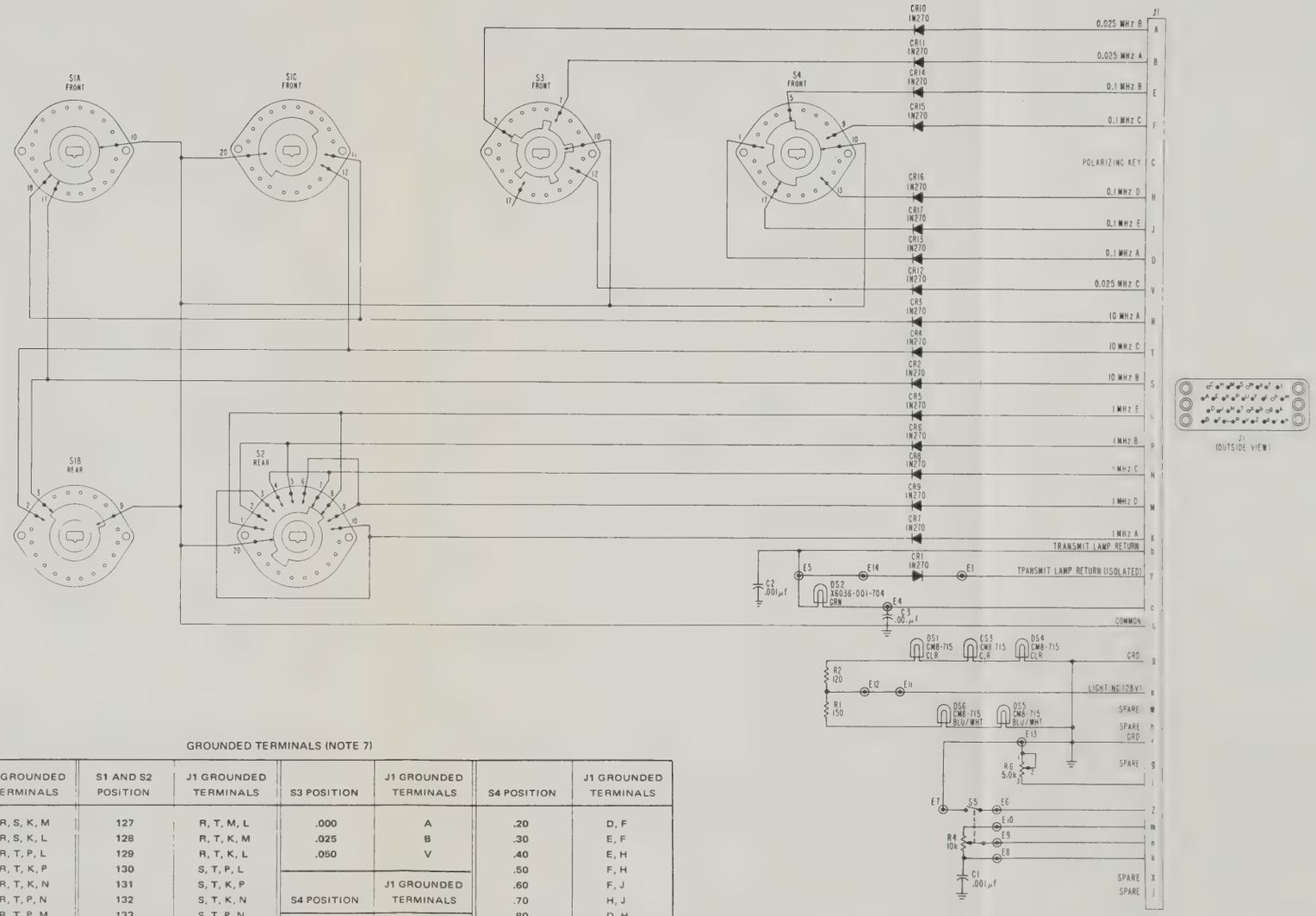
1. For wiring diagram of control
   Figure 6-8.
2. Switch sections are viewed fro
   end of switch and are shown in
   MHz position.
3. S1 controls the grounding of 1(
   selector terminals R, S, and T
   controls the grounding of 1-MH
   terminals K, L, M, N, and P;
   trols the grounding of 0.025-M
   tor terminals A, B, and V; and
   controls the grounding of 0.1-M
   selector terminals D, E, F, H
   (see table). These terminals
   the operating frequency of the
   receiver-transmitter.



-831A Control Unit, Schematic Diagram

NOTES:

1. For wiring diagram of control unit, see Figure 6-8.
2. Switch sections are viewed from knob end of switch and are shown in 116. 000 MHz position.
3. S1 controls the grounding of 10-MHz selector terminals R, S, and T; S2 controls the grounding of 1-MHz selector terminals K, L, M, N, and P; S3 controls the grounding of 0. 025-MHz selector terminals A, B, and V; and S4 controls the grounding of 0. 1-MHz selector terminals D, E, F, H, and J (see table). These terminals control the operating frequency of the RT-831A receiver-transmitter.



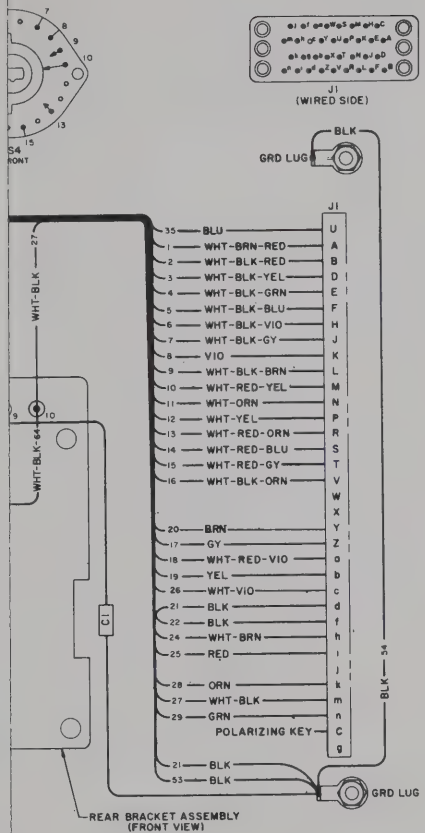
GROUNDED TERMINALS (NOTE 7)

S1 AND S2 POSITION	J1 GROUNDED TERMINALS	S1 AND S2 POSITION	J1 GROUNDED TERMINALS
118	R, S, K, M	127	R, T, M, L
119	R, S, K, L	128	R, T, K, M
120	R, T, P, L	129	R, T, K, L
121	R, T, K, P	130	S, T, P, L
122	R, T, K, N	131	S, T, K, P
123	R, T, P, N	132	S, T, K, N
124	R, T, P, M	133	S, T, P, N
125	R, T, N, M	134	S, T, P, M
126	R, T, N, L	135	S, T, N, M

S3 POSITION	J1 GROUNDED TERMINALS
.000	A
.025	B
.050	V

S4 POSITION	J1 GROUNDED TERMINALS
.00	E, J
.10	D, E
.20	D, F
.30	E, F
.40	E, H
.50	F, H
.60	F, J
.70	H, J
.80	D, H
.90	D, J

Figure 6-7. C-831A Control Unit, Schematic Diagram

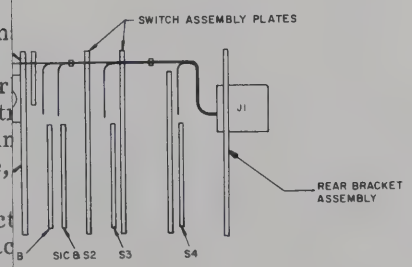


NOTES:

1. For schem

2. Wires mar
24 AWG st
lated. Unn
AWG bare,

3. Switch sect
are displac
locations,



4. Wires 19 a
lighting cir

5. Printed cir
DS1, DS3 a
on front of
supplied th

TP5267

C-831A Control Unit, Wiring Diagram

NOTES:

1. For schematic diagram, see Figure 6-7.
2. Wires marked with color note are No. 24 AWG stranded copper, Teflon insulated. Unmarked wires are No. 24 AWG bare, solid tinned copper.
3. Switch sections and plate assemblies are displaced for clarity. For actual locations, see Detail.
4. Wires 19 and 26 are connected to panel lighting circuit through hole A as shown.
5. Printed circuit panel-lamp board with DS1, DS3 and DS4 (not shown) is mounted on front of front plate. Lamp power is supplied through wires 60 and 61.

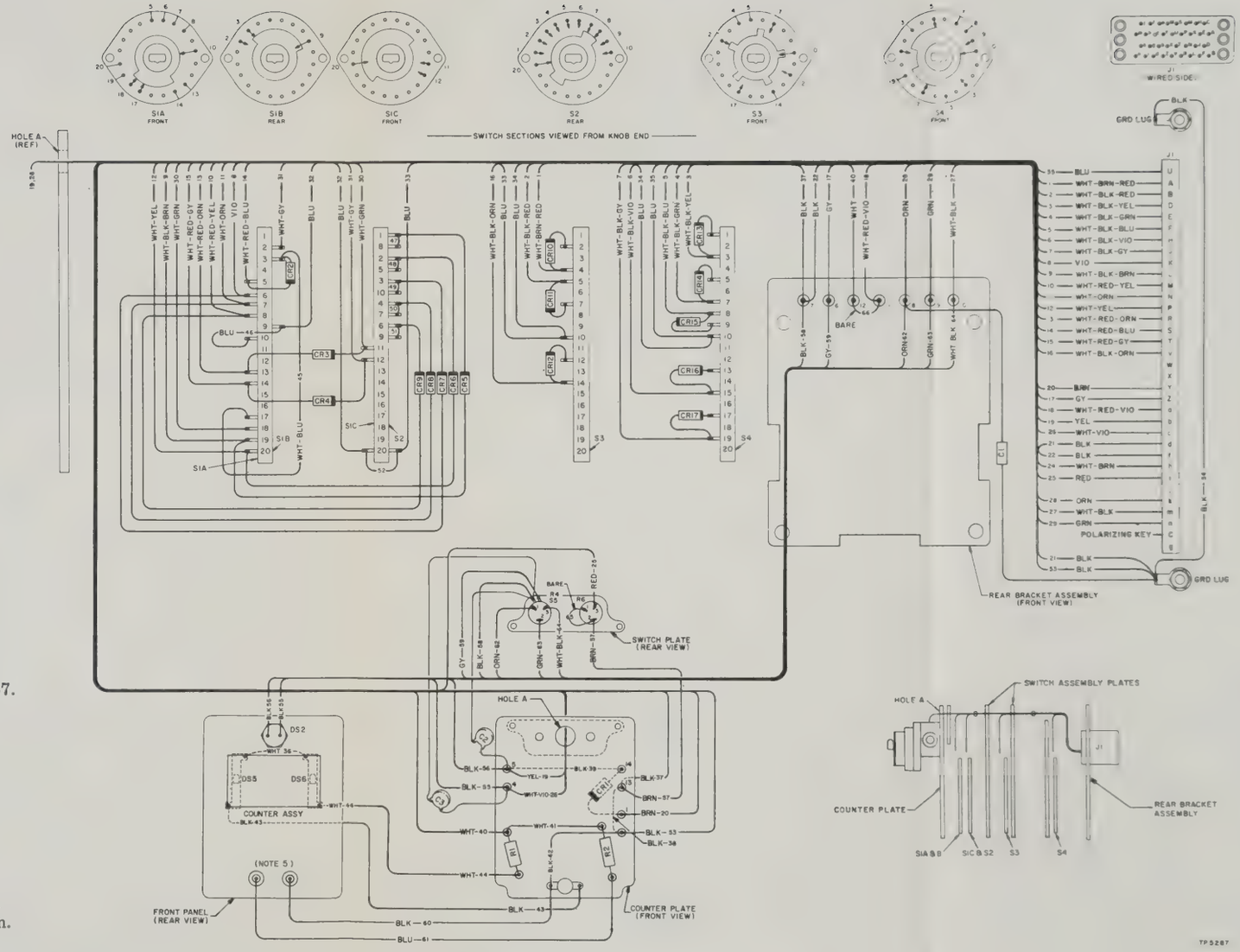
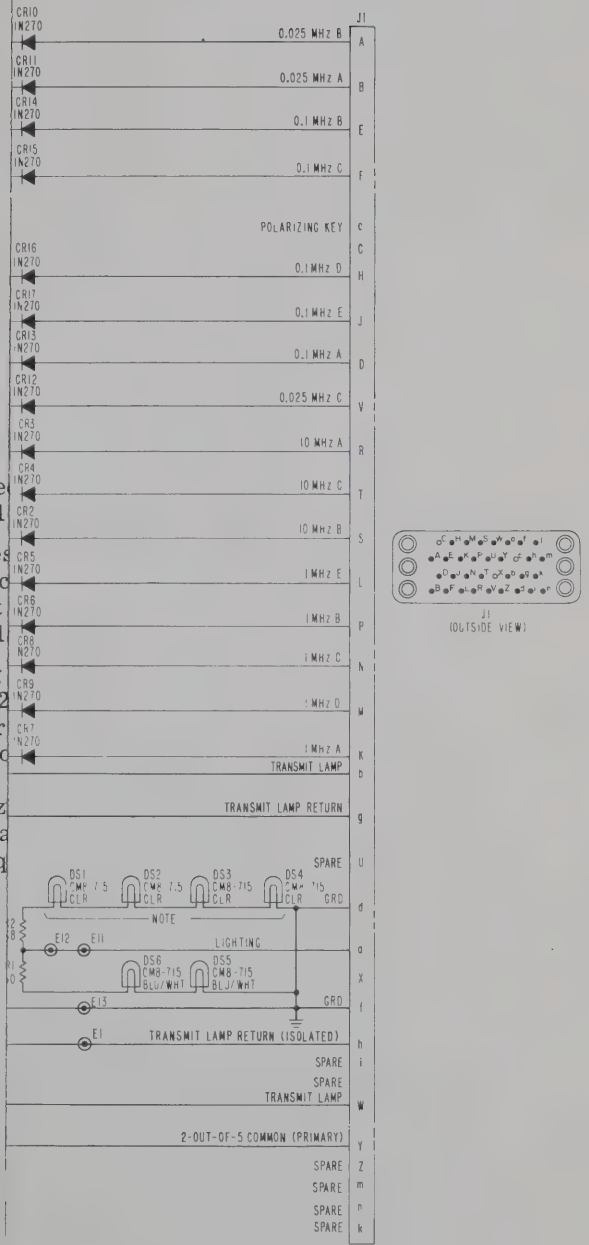


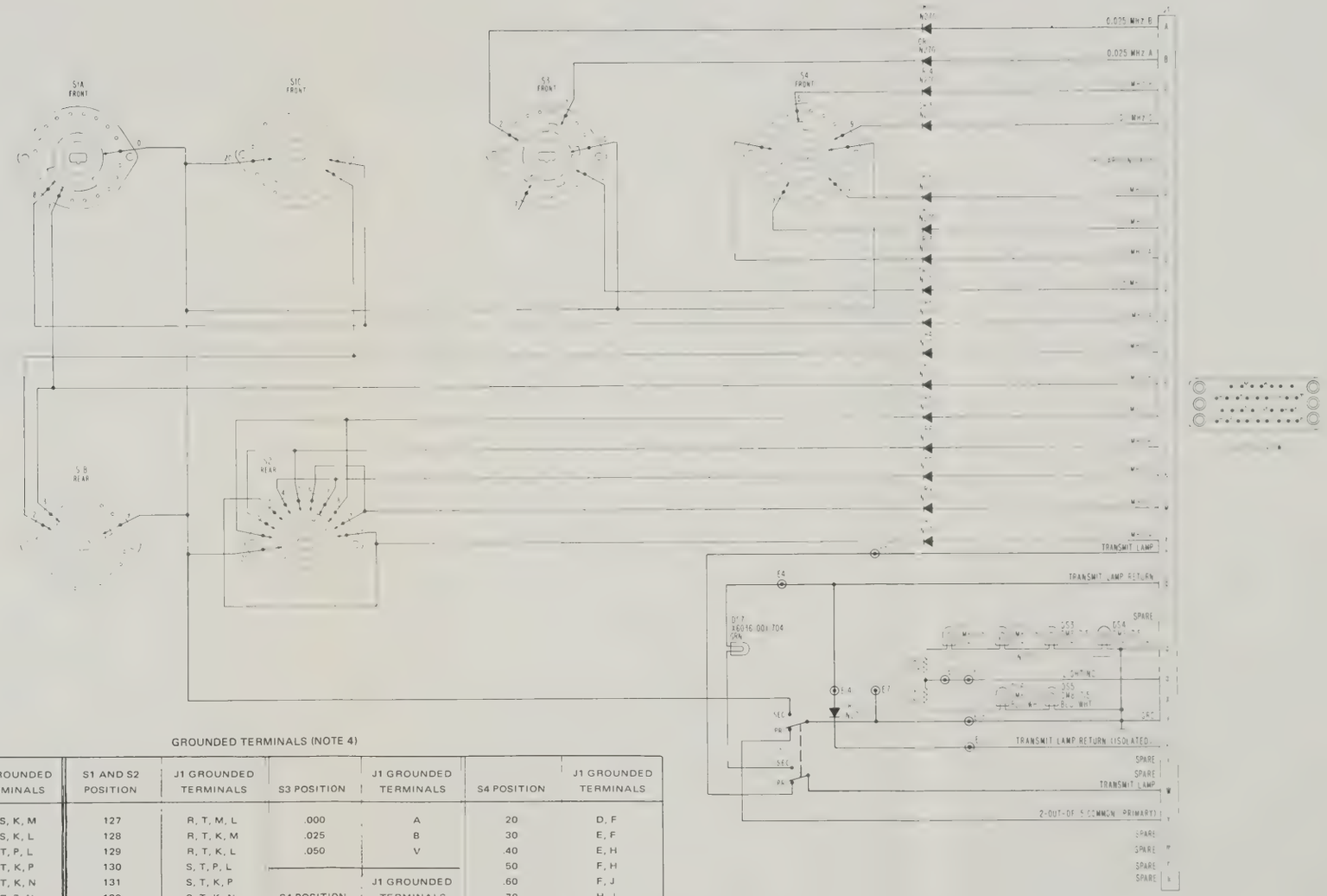
Figure 6-8. C-831A Control Unit, Wiring Diagram

NOTES:

1. For wiring diagram, see
2. Switch sections are viewe switch and are shown in 1
3. As selected, S5 completes mon (ground) circuit for c the test lamp power input Control Unit or the C-831
4. S1 controls the grounding terminals R, S, and T; S2 ing of 1-MHz selector ter and P; S3 controls the gro selector terminals A, B, the grounding of 0.1-MHz D, E, F, H, and J (see ta control the operating freq receiver-transmitter.



1S Control Unit, Schematic Diagram



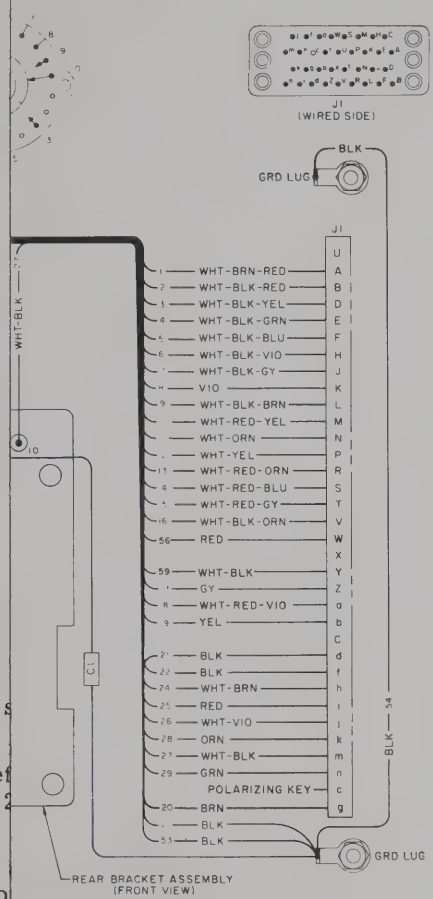
NOTES:

1. For wiring diagram, see Figure 6-10.
2. Switch sections are viewed from knob end of switch and are shown in 116.000 MHz position.
3. As selected, S5 completes the 2-out-of-5 common (ground) circuit for channel selection and the test lamp power input circuit for the C-831A Control Unit or the C-831S Control Unit.
4. S1 controls the grounding of 10-MHz Selector terminals R, S, and T; S2 controls the grounding of 1-MHz selector terminals K, L, M, N, and P; S3 controls the grounding of 0.025-MHz selector terminals A, B, and V; and S4 controls the grounding of 0.1-MHz selector terminals D, E, F, H, and J (see table). These terminals control the operating frequency of the RT-831A receiver-transmitter.

GROUNDED TERMINALS (NOTE 4)

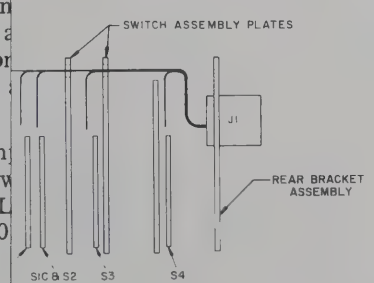
S1 AND S2 POSITION	J1 GROUNDED TERMINALS	S1 AND S2 POSITION	J1 GROUNDED TERMINALS	S3 POSITION	J1 GROUNDED TERMINALS	S4 POSITION	J1 GROUNDED TERMINALS
118	R, S, K, M	127	R, T, M, L	.000	A	20	D, F
119	R, S, K, L	128	R, T, K, M	.025	B	30	E, F
120	R, T, P, L	129	R, T, K, L	.050	V	40	E, H
121	R, T, K, P	130	S, T, P, L			50	F, H
122	R, T, K, N	131	S, T, K, P		J1 GROUNDED TERMINALS	60	F, J
123	R, T, P, N	132	S, T, K, N	S4 POSITION		70	H, J
124	R, T, P, M	133	S, T, P, N			80	D, H
125	R, T, N, M	134	S, T, P, M	00	E, J	90	D, J
126	R, T, N, L	135	S, T, N, M	10	D, E		

Figure 6-9. C-831S Control Unit, Schematic Diagram



NOTES:

1. For schematic diagram, s
2. Wires marked with color
   AWG stranded copper, tef
   Unmarked wires are No. 2
   tinned copper.
3. Switch sections and plate
   displaced for clarity. Fo
   tions, see detail.
4. Wires 40, 53, 56, 57 and
   out through hole A in coun
   shown. Wires 40 and 53 a
   to panel lighting circuit or
   and wires 56, 57, and 59
   to S5 on front panel.
5. Printed circuit panel-lam
   DS1 through DS4 (not show
   on front of front panel. L
   supplied through wires 60



S Control Unit, Wiring Diagram

NOTES:

1. For schematic diagram, see Figure 6-9.
2. Wires marked with color note are No. 24 AWG stranded copper, teflon insulated. Unmarked wires are No. 24 AWG bare, tinned copper.
3. Switch sections and plate assemblies are displaced for clarity. For actual locations, see detail.
4. Wires 40, 53, 56, 57 and 59 are brought out through hole A in counter plate as shown. Wires 40 and 53 are connected to panel lighting circuit on counter plate and wires 56, 57, and 59 are connected to S5 on front panel.
5. Printed circuit panel-lamp board with DS1 through DS4 (not shown) is mounted on front of front panel. Lamp power is supplied through wires 60 and 61.

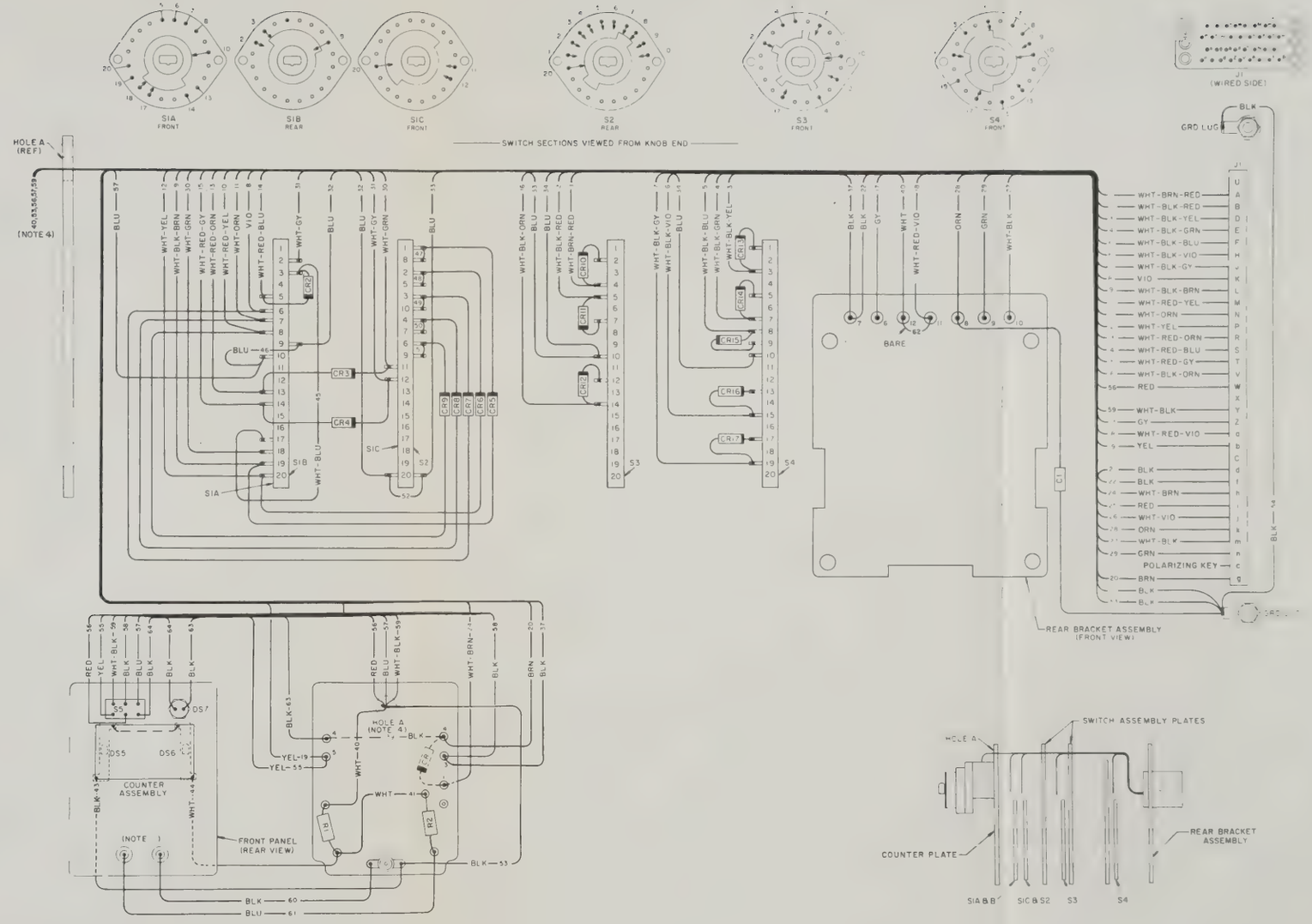


Figure 6-10. C-831S Control Unit, Wiring Diagram

SECTION VII

PARTS LISTS

7-1. GENERAL.

This section lists and describes the replaceable parts for the RT-831A Receiver-Transmitter, RTA-831A Accessory Unit, and C-831A and C-831S Control Units.

7-2. RT-831A RECEIVER-TRANSMITTER AND RTA-831A ACCESSORY UNIT.

The parts for the RT-831A Receiver-Transmitter and RTA-831A Accessory Unit are listed in an alphabetical-numerical sequence of the reference designations assigned to the parts on the schematic diagrams. The reference designations as shown are abbreviated; for the complete designation, prefix the designation shown with the assembly designation included at the beginning of each list. For example, the complete reference designation for Mixer Assembly A2 in the RF Assembly A1 would be A1A2 and that for Capacitor C1 in the Mixer Assembly would be A1A2C1. The location of a part by its reference designation may be determined by referring to the applicable assembly wiring diagram or parts location diagram, Figures 6-2 and 6-3 for the RT-831A and Figures 6-5, 6-5A, and 6-6 for the RTA-831A.

Within each assembly parts list, complete information is given for a part listed for the first time. Subsequent listings of the same part within the same assembly are referred back to the original listing.

7-3. C-831A AND C-831S CONTROL UNITS.

The parts for the C-831A and C-831S Control Units are listed in a recommended order of disassembly, except for attaching parts which are listed directly after the part attached. Index numbers are assigned in sequence to each part and are keyed to an exploded view, Figure 7-1 for the C-831A and Figure 7-2 for the C-831S. Where only certain parts of an assembly are procurable, these are preceded by the caption "Partial Breakdown Follows." For cross-reference, a part number numerical index and a reference designation index are included following the parts list.

7-4. MANUFACTURERS' CODES AND PART NUMBERS.

Part numbers are listed in a separate column in the parts lists. Other manufacturers' part numbers are identified by the manufacturer's numerical code (based on the Federal Supply Code for Manufacturers) and the manufacturer's part number. This information is listed either in a separate column or enclosed within parentheses at the end of the part description.

The numerical codes used in the parts lists and the names and addresses of the manufacturers are as follows:

Code	Name and Address
00656	Aerovox Corp. 740 Belleville Avenue New Bedford, Massachusetts 02741
01121	Allen-Bradley Co. 1201 South 2nd Street Milwaukee, Wisconsin 53204
01281	TRW Semiconductors, Inc. 14520 Aviation Blvd. Lawndale, California 90260
01295	Texas Instruments, Inc. Semiconductor-Components Division 13500 North Central Expressway Dallas, Texas 75231
02006	United States Radium Corp. 4150 Old Berwick Road Bloomsburg, Pennsylvania 17815
02660	Amphenol Corp. 2801 South 25th Avenue Broadview, Illinois 60153
04713	Motorola Semiconductor Products, Inc. 5005 East McDowell Road Phoenix, Arizona 85008
05627	Applied Research, Inc. 76 South Bayles Avenue Port Washington, New York 11050
06776	Robinson Nugent, Inc. 802 East 8th Street P. O. Box 486 New Albany, Indiana 47150
09214	General Electric Co. Semiconductor Products Department West Genesee Street Auburn, New York 31022
12040	National Semiconductor Corp. Commerce Drive P. O. Box 443 Danbury, Connecticut 06810
12969	Unitrode Corp. 580 Pleasant Street Watertown, Massachusetts

Code	Name and Address
13327	Solitron Devices 256 Oak Tree Road Tappan, New York 10983
25403	Amperex Electronic Corp. Semiconductor and Receiving Tube Div. Providence Pike Slatersville, Rhode Island 02876
44655	Ohmite Manufacturing Co. 3601 West Howard Street Shokie, Illinois 60076
56289	Sprague Electric Co. 367 Marshall Street North Adams, Massachusetts 01247
71468	ITT Cannon Electric, Inc. 3208 Humbolt Street Los Angeles, California 90031
71590	Centralab Division of Globe-Union, Inc. 932 East Keefe Avenue Milwaukee, Wisconsin 53212
71744	Chicago Miniature Lamp Works 4433 Ravenswood Avenue Chicago, Illinois 60640
72136	Electro Motive Manufacturing Co., Inc. South Park and John Streets Willimantic, Connecticut 06226
72259	Nytronics, Inc. 550 Springfield Avenue Berkeley Heights, New Jersey 07922
72765	Drake Manufacturing Co. 4626 North Olcott Avenue Harwood Heights, Illinois 60656
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
73445	Amperex Electronic Corp. 230 Duffy Avenue Hicksville, Long Island, New York 11801
74868	Amphenol Corp. Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
74970	E. F. Johnson Co. 297 10th Avenue South West Waseca, Minnesota 56093
75915	Littelfuse, Inc. 800 East Northwest Highway Des Plains, Illinois 60016
77342	American Machine and Foundry Co. Potter and Brumfield Division 1200 East Broadway Princeton, Indiana 47570
78189	Shakeproof Div. of Ill. Tool Works, Inc. 1955 St. Charles Road Elgin, Illinois 60120
78488	Stackpole Carbon Co. St. Marys, Pennsylvania 15857
79089	Radio Corp. of America Solid State and Receiving Tube Division 415 South 5th Street Harrison, New Jersey 07029
79136	Waldes Kohinoor, Inc. 47-16 Austel Place Long Island City, New York 11101
80223	United Transformer Co. 150 Varick Street New York, New York 10013
80294	Bourns Inc. 1200 Columbia Avenue Riverside, California 92507
80740	Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, California 92634
81312	Winchester Electronics Division Litton Industries, Inc. Main Street and Hillside Avenue Oakville, Connecticut 06779
90634	Gulton Industries, Inc. 212 Durham Avenue Metuchen, New Jersey 08840
91662	Elco Corp. Maryland Road and Computer Avenue Willow Grove, Pennsylvania 19090
93332	Sylvania Electric Products, Inc. Semiconductor Products Division 100 Sylvan Road Woburn, Massachusetts 01801
95105	Collins Radio Co. Components Division 19700 Jamboree Road P. O. Box C Newport Beach, California 92660
95146	Alco Electronics Products, Inc. 3 Wolcott Avenue Lawrence, Massachusetts 01843
95712	Dage Electric Co., Inc. Hurricane Road Franklin, Indiana 46131
98291	Sealectro Corp. 225 Hoyt Street Mamaroneck, New York 10544

RT-831A RECEIVER-TRANSMITTER

Reference Designation	Description	Part Number	Manufacturer & Part No.
	RF ASSEMBLY A1 (41853)		
A1	RF AMPLIFIER ASSEMBLY	42205	
A2	MIXER ASSEMBLY	41854	
	RF AMPLIFIER ASSEMBLY A1A1 (42205)		
C1	CAPACITOR, Fixed, ceramic, 10 pF ±5%, 75 Vdc	29597-0100	
C2	CAPACITOR, Fixed, ceramic, feed-thru, 470 pF, 200 Vdc	30949-0471	72982 Type RS-198
C3	CAPACITOR, Fixed, tantalum, 1 μF ±20%, 35 Vdc	21485-9101	
C4	CAPACITOR, Fixed, ceramic, 1000 pF ±10%, 200 Vdc	30949-0102	72982 Type RS-198
C5	CAPACITOR, Fixed, ceramic, 1500 pF ±10%, 200 Vdc	30949-0152	72982 Type RS-198
C6	Same as C4		
C7	CAPACITOR, Fixed, electrolytic, 22 μF ±20%, 15 Vdc	8920-0220	56289 150D226X-001582
C8	Same as C2		
C9	(Not used)		
C10	(Not used)		
C11	(Not used)		
C12	CAPACITOR, Fixed, ceramic, feed-thru, 1000 pF, 500 Vdc	36463-7102	01121 Type FW5N
C13	Same as C12		
C14	CAPACITOR, Variable, ceramic, 2-8pF, 350 Vdc	34231-0001	72982 Type 538
CR1	SEMICONDUCTOR DEVICE, Diode	32689-0005	01295 1N458
L1	COIL, RF, 0.10 μH ±10%	35637-9102	72259 DD-0.10
L2	Same as L1		
Q1	TRANSISTOR	39094	25403 A466
	TRANSISTOR	41123-0049	25403 BF198
R1	RESISTOR, Fixed, comp, 100Ω ±10%, 1/8W	199-1101	01121 BB1011
R2	RESISTOR, Fixed, comp, 47Ω ±10%, 1/8W	199-1470	01121 BB4701
R3	RESISTOR, Fixed, comp, 3300Ω ±10%, 1/8 W	199-1332	01121 BB3321
R4	RESISTOR, Fixed, comp, 1800Ω ±10%, 1/8W	199-1182	01121 BB1821
R5	RESISTOR, Fixed, comp, 6800Ω ±10%, 1/8W	199-1682	01121 BB6821
R6	RESISTOR, Fixed, comp, 680Ω ±10%, 1/8W	199-1681	01121 BB6811
R7	(Not used)		
R8	RESISTOR, Fixed, comp, 330Ω ±10%, 1/8W	199-1331	01121 BB3311
R9	(Not used)		
R10	(Not used)		
R11	RESISTOR, Fixed, comp, 220Ω ±10%, 1/8W	199-1221	01121 BB2211
	MIXER ASSEMBLY A1A2 (41854)		
C1	(Not used)		
C2	CAPACITOR, Fixed, electrolytic, 1 μF ±20%, 35 Vdc	21485-9101	
C3	CAPACITOR, Fixed, ceramic, 1000 pF GMV, 500 Vdc	36463-7102	01121 Type FW5N
C4	CAPACITOR, Fixed, ceramic, ±10% 200 Vdc	30949-0102	
C5	Same as C4		
C6	Same as C2		
C7	CAPACITOR, Variable, air dielectric, 1.9 to 7.3 μF	36105-0353	74970 189-353-5
C8	CAPACITOR, Variable, ceramic, 4.5 to 20 pF +7 - 10%, 160 Vdc	36432	

Reference Designation	Description	Part Number	Manufacturer & Part No.	
	MIXER ASSEMBLY A1A2 (41854) (Continued)			
CR1	SEMICONDUCTOR DEVICE, Diode	32689-0005	01295	1N458
J1	CONNECTOR, Receptacle, electrical	37242	98291	51-745-0000 -2G
J2	(Not used)			
J3	(Not used)			
J4	CONNECTOR, Receptacle, electrical	36631	98291	51-012-0000
L1	COIL, RF, 1 μH ±10%	35637-9101	72259	DD-1.00
L2	Same as L1			
L3	COIL, RF, 1000 μH	35637-0102	72259	DD-1000
Q1, Q2	TRANSISTORS, Matched pair, two type 2N3819	39037	01295	SFB8084
R1	(Not used)			
R2	RESISTOR, Variable 0 to 500Ω ±30%, 1/2W	35955-0501	80740	Type 62P
R3	RESISTOR, Variable, 0 to 1000Ω ±30%, 1/2W	35955-0102	80740	Type 62P
R4	RESISTOR, Fixed, comp, 1000Ω ±10%, 1/8W	199-1102	01121	BB1021
R5	RESISTOR, Fixed, comp, 330Ω ±10%, 1/8W	199-1331	01121	BB3311
R6	RESISTOR, Fixed, comp, 1000Ω ±10%, 1/8W	199-1102	01121	BB1021
R7	RESISTOR, Fixed, comp, 1800Ω ±10%, 1/8W	199-1182	01121	BB1821
R8	RESISTOR, Fixed, comp, 68Ω ±10%, 1/8W	199-1680	01121	BB6801
T1	TRANSFORMER, RF, Toroid	37344		
T2	TRANSFORMER, Output	37342		
	IF ASSEMBLY A2 (41828)			
A1	1st IF AMPLIFIER, Microcircuit	37108		
A2	2nd MIXER OSCILLATOR ASSEMBLY, Microcircuit	37107		
A3	2nd IF AMPLIFIER ASSEMBLY, Microcircuit	37106-0000		
A4	AGC ASSEMBLY, Microcircuit	41857		
A5	AUDIO COMPRESSOR ASSEMBLY, Microcircuit	37104		
A6	SQUELCH ASSEMBLY, Microcircuit	41856		
A7	AUDIO AMPLIFIER ASSEMBLY, Microcircuit	37109		
C1	CAPACITOR, Fixed, ceramic, 0.1 μF +80 -20%, 25 Vdc	29294-9102		
J1	CONNECTOR, Receptacle, electrical	35544-1012	91662	Type 8129
P1	(Not used)			
P2	CONNECTOR, RF	37239	98291	51-728-0000-2G
R1	RESISTOR, Fixed, comp, 100kΩ ±10%, 1/8 W	199-1104	01121	BB1041
T1	TRANSFORMER, Audio, transistor, 500 mW, 49V	37264	80223	Type DO-T22
Z1	FILTER, Bandpass	38929		

Reference Designation	Description	Part Number	Manufacturer & Part No.	
	REGULATOR ASSEMBLY A3 (41905)			
C1	CAPACITOR, Fixed, electrolytic, 150 μF ±20%, 15 Vdc	8920-0151	56289	150D157X-0015B2
C2	CAPACITOR, Fixed, electrolytic, 47 μF ±20%, 6 Vdc	8918-0470	56289	150D476X-0006B2
C3	CAPACITOR, Fixed, ceramic, 1000 pF ±10%, 200 Vdc	30949-0102		
CR1	(Not used)			
CR2	SEMICONDUCTOR DEVICE, Diode	32689-0008	01295	1N459A
P1	CONNECTOR, Plug, electrical	35029-1002	71468	DCM-27W2P
Q1	TRANSISTOR	36370-3054	79089	2N3054
Q2	TRANSISTOR	36961-4124	04713	2N4124
Q3	Same as Q2			
Q4	TRANSISTOR	36371-3703	01295	2N3703
Q5	Same as Q2			
R1	RESISTOR, Fixed, comp, 820Ω ±5%, 1/4W	341-0821	01121	CB8215
R2	RESISTOR, Fixed, comp, 4700Ω ±5%, 1/4W	341-0472	01121	CB4725
R3	RESISTOR, Fixed, comp, 1000Ω ±5%, 1/4W	341-0102	01121	CB1025
R4	RESISTOR, Variable, carbon, 10kΩ ±30%, 0.1W	33868-0103	71590	Type 601-1
R5	RESISTOR, Fixed, comp, 560Ω ±5%, 1/4W	341-0561	01121	CB5615
R6	Same as R3			
R7	RESISTOR, Fixed, comp, 220Ω ±5%, 1/4W	341-0221	01121	CB2215
R8	RESISTOR, Variable 200Ω ±1%, 1/2W	40878-1221	80294	Type 3359W
R9	RESISTOR, Fixed, comp, 180Ω ±5%, 1/4W	341-0181	01121	CB1815
R10	RESISTOR, Fixed, comp, 150Ω ±5%, 1/4W	341-0151	01121	CB1515
R11	RESISTOR, Fixed, comp, 5100Ω ±5%, 1/4W (Not used in all units)	341-0512	01121	CB5125
R12	RESISTOR, Fixed, comp, 200Ω ±5%, 1/4W	341-0201	01121	CB2015
R13	RESISTOR, Fixed, comp, 12Ω ±5%, 1/2W	201-0120	01121	EB1205
RT	THERMISTOR, 100Ω ±10%	27607-0003	90634	21TE2
VR1	SEMICONDUCTOR DEVICE, Diode, Zener	31477-9241	04713	1N4370A
	SYNTHESIZER FREQUENCY ASSEMBLY A4 (38462)			
	Note The detail parts of this assembly are nonprocurable.			
	CHASSIS ASSEMBLY A5 (P/O 41700)			
C1	CAPACITOR, Fixed, ceramic, feed-thru, 1000 pF +80 -20%, 500 Vdc	8832-000	72982	Type 2404
C2-C16	Same as C1			
C17	CAPACITOR, Fixed, ceramic 0.001 μF S100-0%, 500 Vdc	8625-9104		
C18	CAPACITOR, Fixed, ceramic, 100 pF, 200 Vdc (Not used in all units)	28448-0101	72982	Type X5F
C19	Same as C18 (Not used in all units)			

Reference Designation	Description	Part Number	Manufacturer & Part No.	
	CHASSIS ASSEMBLY A5 (P/O 41700) (Continued)			
J1	CONNECTOR, Receptacle, electrical	35029-0002	71468	DCM27W25
J2	CONNECTOR, Receptacle, electrical, consisting of:			
	1 Connector body	35860-0126	81312	MRAC26P
	24 Contacts, electrical	35861-2120	81312	100-2020P
J3	CONNECTOR, Receptacle, electrical, consisting of:			
	1 Connector body	35860-0134	81312	MRAC34P
	30 Contacts, electrical	35861-2120	81312	100-2020P
J4	CONNECTOR, Receptacle, electrical	36225	74868	46825
J5	CONNECTOR, Receptacle, electrical	35101	95712	type 8050-3
P1	CONNECTOR, Plug, electrical	35544-0012	91662	Type 8129
P2	CONNECTOR, Plug, electrical, consisting of:			
	1 Connector body (Original units)	36453-0117	02660	Type 223
	1 Connector body (M1 and later units)	36185-0117	02660	Type 223
	17 Contacts, electrical	35817-1101	02660	220-P02

RTA-831A ACCESSORY UNIT

TRANSMITTER-AMPLIFIER ASSEMBLY A1 (P/O 38511)				
C1	CAPACITOR, Fixed, ceramic, 1000 pF ±10%, 500 Vdc	31037-0102		
C2	Same as C1			
C3	Same as C1			
C4	CAPACITOR, Fixed, mica, 56 pF ±5%, 250 Vdc	36245-0560	72136	Type DM10
C5	Same as C1			
C6	Same as C1			
C7	CAPACITOR, Fixed, mica, 62 pF ±5%, 250 Vdc	36245-0620	72136	Type DM10
C8	Same as C1			
C9	CAPACITOR, Fixed, ceramic, 0.1 μF ±20%, 25 Vdc	37732-0104	00656	Type ULA702
C10	(Not used)			
C11	Same as C1			
C12	CAPACITOR, Variable, mica, 7 to 100 pF, 175 Vdc	38310-1423	72136	423
C13	Same as C1			
C14	Same as C9			
C15	Same as C9			
C16-C19	Same as C12			
C20	CAPACITOR, Variable, mica, 24 to 200 pF, 175 Vdc	38310-1425	72136	425
C21	Same as C12			
C22	Same as C9			
CR1	SEMICONDUCTOR DEVICE, Diode	36293-0005	01295	1N645
CR2	Same as CR1			
CR3	Same as CR1			
CR4	SEMICONDUCTOR DEVICE, Diode, Zener type	36302-0330	12960	UZ5733
FL1	FILTER, Low pass, feed-thru, 1/4 A, 200 Vdc	27628	01121	Type SMFO-2
FL2	Same as FL1			
J1	CONNECTOR, Receptacle, electrical	36943	98291	51-045-0000
J2	CONNECTOR, Receptacle, electrical	37282	98291	51-046-0000
J3	CONNECTOR, Receptacle, electrical, consisting of:			
	1 Connector body	36185-0105	02660	Type 223
	5 Contacts electrical	35817-1101	02660	220-P02
L1	COIL, RF, 1.0 μH	34894-8101		
L2	COIL, RF, 6.8 μH	34894-8681		
L3	COIL, RF, 0.47 μH	34894-8472		
L4	Same as L3			
L5	COIL, RF, 0.1 μH	34894-8102		

Reference Designation	Description	Part Number	Manufacturer & Part No.
TRANSMITTER-AMPLIFIER ASSEMBLY A1 (P/O 38511) (Continued)			
Q1	TRANSISTOR	38205-0001	01281 PT3138A
	TRANSISTOR	38202-0001	01281 PT3138A
Q2	TRANSISTOR	38205-0002	01281 PT3138B
	TRANSISTOR	38202-0002	01281 PT3138B
Q3	TRANSISTOR	38205-0003	01281 PT3138C
	TRANSISTOR	38202-0003	01281 PT3138C
Q4	TRANSISTOR	38205-0004	01281 PT3138D
	TRANSISTOR	38202-0004	01281 PT3138D
Q5	TRANSISTOR	38205-0005	01281 PT3138E
	TRANSISTOR	38202-0005	01281 PT3138E
R1	RESISTOR, Fixed, comp, 47Ω ±10%, 1/4W	200-0470	01121 CB4701
R2	RESISTOR, Fixed, comp, 1800Ω ±10%, 1/4W	200-0182	01121 CB1821
R3	RESISTOR, Fixed, comp, 6800Ω ±10%, 1/4W	200-0682	01121 CB6821
R4	RESISTOR, Fixed, comp, 39Ω ±10%, 1/4W	200-0390	01121 CB3901
R5	RESISTOR, Fixed, comp, 220Ω ±10%, 1/4W	200-0221	01121 CB2211
R6	RESISTOR, Fixed, comp, 1000Ω ±10%, 1/4W	200-0102	01121 CB1021
R7	RESISTOR, Fixed, comp, 33Ω ±10%, 1/4W	200-0330	01121 CB3301
R8	RESISTOR, Fixed, comp, 130Ω ±5%, 1/2W	200-0131	01121 EB1315
R9	RESISTOR, Fixed, comp, 510Ω ±5%, 1/2W	201-0511	01121 EB5115
R10	RESISTOR, Fixed, comp, 20Ω ±5%, 1/2W	201-0200	01121 EB2005
R11	RESISTOR, Fixed, comp, 12Ω ±5%, 1/2W	201-0120	01121 EB1205
R12	RESISTOR, Fixed, comp, 75Ω ±5%, 1/2W	201-0750	01121 EB7505
R13	RESISTOR, Fixed, comp, 27Ω ±5%, 1/2W	201-0270	01121 EB2705
R14	RESISTOR, Fixed, comp, 100Ω ±5%, 1/2W	201-0101	01121 EB1015
	RESISTOR, Fixed, comp, 33Ω ±5%, 1/2W	201-0330	01121 EP3305
R15	Same as R14		
R16	Same as R5		
R17	RESISTOR, Fixed, comp, 330Ω ±10%, 1/4W	200-0331	01121 CB3311
R18	RESISTOR, Fixed, comp, 18Ω ±5%, 1/4W (not used in all units)	0180	01121 CB1805
R19	RESISTOR, Fixed, comp, 68Ω ±5%, 1/4W (not used in all units)	341-0680	01121 CB6805
R20	Same as R18 (not used in all units)		
R21	RESISTOR, Fixed, comp, 120Ω ±5%, 1/4W (not used in all units)	202-0121	01121 GB1215
T1	TRANSFORMER, RF	38507	
T2	TRANSFORMER, RF	38506	
T3	TRANSFORMER, RF	38505	
T4	TRANSFORMER, RF	38393	
T5	TRANSFORMER, RF	38394	
FILTER-TRANSMIT DETECTOR ASSEMBLY A2 (41818)			
Note The detail parts of this assembly are nonprocurable.			
FILTER ASSEMBLY, BANDPASS A3 (36461)			
Note The detail parts of this assembly are nonprocurable.			
RELAY DELAY ASSEMBLY A4 (41823)			
Note The detail parts of this assembly are nonprocurable.			

Reference Designation	Description	Part Number	Manufacturer & Part No.	
	PRINTED CIRCUIT ASSEMBLY, REGULATOR A5 (36859)			
C1	CAPACITOR, Fixed, electrolytic, 47 μF ±20%, 50 Vdc	8924-0470	56289	109D476X-0050F2
C2	CAPACITOR, Fixed, electrolytic, 47 μF ±20%, 35 Vdc	21485-0470		
C3	Same as C1			
C4	CAPACITOR, Fixed, electrolytic, 47 μF ±20%, 20Vdc	34118-0470	56289	Type 164D
C5	CAPACITOR, Fixed, electrolytic, 40 μF ±20%, 10Vdc	8919-0400	56289	150D406X-0010B2
C6	Same as C5			
C7	CAPACITOR, Fixed, electrolytic, 68 μF ±20%, 35 Vdc	21485-9681		
C8	CAPACITOR, Fixed, electrolytic, 0.068 μF ±20%, 35 Vdc	21485-9683		
C9	Same as C8			
CR1	SEMICONDUCTOR DEVICE, Diode, Zener type	35954-0100	04713	1N4740A
CR2	SEMICONDUCTOR DEVICE, Diode, Zener type	31477-9681	04713	1N754A
CR3	Same as CR2			
CR4	Same as CR2			
CR5	SEMICONDUCTOR DEVICE, Diode	18723	09214	1N91
F1	FUSE, Instrument, 3A	36968-3002	75915	276003
F2	Same as F1			
Q1	TRANSISTOR	34619-0000	79089	2N3053
Q2	TRANSISTOR	34086-0002	79099	40232
Q3	(Not used)			
Q4	Same as Q1			
Q5	Same as Q2			
R1	RESISTOR, Fixed, comp, 270Ω ±10%, 1/4W	200-0271	01121	CB2711
R2	RESISTOR, Fixed, comp, 160Ω ±5%, 1/4W	341-0161	01121	CB1615
R3-R5	(Not used)			
R6	RESISTOR, Fixed, comp, 39Ω ±10%, 1/4W	200-0390	01121	CB3901
R7	RESISTOR, Variable, 0 to 50Ω ±30%, 1/2W	35955-0500	80740	Type 62P
R8	RESISTOR, Fixed, comp, 12Ω ±10%, 1/4W	200-0120	01121	CB1201
R9	RESISTOR, Fixed, comp, 330Ω ±10%, 1/4W	200-0331	01121	CB3311
R10	RESISTOR, Fixed, comp, 150Ω ±10%, 1/4W	200-0151	01121	CB1511
R11-R13	(Not used)			
R14	RESISTOR, Fixed, comp, 100Ω ±10%, 1/4W	200-0101	01121	CB1011
R15	RESISTOR, Variable, 0 to 100Ω ±30%, 1/2W	35955-0101	80740	Type 62P
R16	RESISTOR, Fixed, comp, 27Ω ±10%, 1/4W	200-0270	01121	CB2701
	MODULATOR-AMPLIFIER ASSEMBLY A6 (P/O 38511)			
A1	LIMITER ASSEMBLY, Audio	37664		
A2	SWITCH ASSEMBLY, Audio	36898		
A3	AMPLIFIER ASSEMBLY, Audio	38290		
C1	CAPACITOR, Fixed, ceramic, 100 pF ±5%, 75-200 Vdc (Not used in all units)	28651-0101		
C2	CAPACITOR, Fixed, Tantalum, 1 uF ±10%, 35 Vdc (Not used in all units)	40248-1074	56289	Type 196D
CR1	SEMICONDUCTOR DEVICE, Diode	36632-4003	04713	1N4003
CR2	Same as CR1			
J1	CONNECTOR, Receptacle, electrical, consisting of:			
	1 Connector body	36185-0109	02660	Type 223
	9 Contacts, electrical	35817-3101	02660	220-834-01
J2	(Not used)			

Reference Designation	Description	Part Number	Manufacturer & Part No.	
	MODULATOR-AMPLIFIER ASSEMBLY A6 (P/O 38511) (Continued)			
J3	JACK, Test, White	37286-0910	98291	Type SKT114PC
J4	Same as J3			
J5	SOCKET, Pin	36967-0011	06776	PS-404-40
J6	Same as J5			
P1	JUMPER, DISCONNECT	35103		
P2	PLATE ASSEMBLY	36838		
P3	CONNECTOR, Plug, electrical	37942		
Q1, Q2	TRANSISTORS, matched pair, two type 36370-0549 transistors	36370-0549	79089	36370-0549
R1	RESISTOR, Fixed, ww, 0 47Ω ±10%, 3W	30700-9472	56289	Type 242E
R2	Same as R1			
R3	(Not used)			
R4	(Not used)			
R5	RESISTOR, Fixed, comp, 33Ω ±5%, 1/2W	201-0330	01121	EB3305
R6	RESISTOR, Fixed, comp, 180Ω ±5%, 1W	202-0181	01121	GB1815
R7	RESISTOR, Fixed, comp, 47kΩ ±5%, 1/4W (Not used in all units)	341-0473	01121	C84735
T1	TRANSFORMER, Audio	38416		
	SWITCH ASSEMBLY, SOLID STATE A7 (41941)			
C1	CAPACITOR, Fixed, electrolytic, 6.8 μF, ±20%, 35 Vdc	21485-9681		
C2	CAPACITOR, Fixed, electrolytic, 1 μF ±20%, 35 Vdc	21485-9101		
C3	CAPACITOR, Fixed, electrolytic, 47 μF ±20%, 50 Vdc	8924-0470	56289	109D476X-0050F2
C4	CAPACITOR, Fixed, electrolytic, 0.068 μF ±20%, 35 Vdc	21485-9683		
C5	CAPACITOR, Fixed, electrolytic, 40 μF ±20%, 10 Vdc	8919-0400	56289	150D406X-0010B2
C6	CAPACITOR, Fixed, tantalum, 10 μF ±20%, 20 Vdc	40248-2211	56289	Type 196D
CR1	SEMICONDUCTOR DEVICE, Diode	36615-1484	93332	1N484A
CR2-CR4	Same as CR1			
CR5	(Not used)			
CR6	SEMICONDUCTOR DEVICE, Diode, Zener type	31477-9561	04713	1N752A
CR7	Same as CR6			
Q1	TRANSISTOR	41123-0008	79089	2N6100
Q2	TRANSISTOR	36613-4235	04713	2N4235
Q3	TRANSISTOR	34619-0000	79089	2N3053
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q3			
Q7	Same as Q3			
Q8	TRANSISTOR	36961-4124	04713	2N4124
Q9	TRANSISTOR	36962-4126	04713	2N4126

Reference Designation	Description	Part Number	Manufacturer & Part No.	
	SWITCH ASSEMBLY, SOLID STATE A7 (41941) (Continued)			
R1	RESISTOR, Fixed, comp, 680Ω ±10%, 1/4W	200-0681	01121	CB6811
R2	RESISTOR, Fixed, comp, 1200Ω ±10%, 1/4W	200-0122	01121	CB1221
R3	RESISTOR, Fixed, comp, 68kΩ ±10%, 1/4W	200-0683	01121	CB6831
R4	RESISTOR, Fixed, comp, 27kΩ ±10%, 1/4W	200-0273	01121	CB2731
R5	Same as R2			
R6	RESISTOR, Fixed, comp, 10kΩ ±10%, 1/4W	200-0103	01121	CB1031
R7	RESISTOR, Fixed, comp, 5600Ω ±10%, 1/4W	200-0562	01121	CB5621
R8	RESISTOR, Fixed, comp, 1kΩ ±10%, 1/4W	200-0102	01121	CB1021
R9	RESISTOR, Fixed, comp, 330Ω ±10%, 1/4W	200-0331	01121	CB3311
R10	RESISTOR, Fixed, comp, 150Ω ±10%, 1/4W	200-0151	01121	CB1511
R11	RESISTOR, Fixed, comp, 27Ω ±10%, 1/4W	200-0270	01121	CB2701
R12	RESISTOR, Fixed, comp, 100Ω ±10%, 1/4W	200-0101	01121	CB1011
R13	RESISTOR, Variable, 100Ω ±30%, 1/10W	33868-0101	71590	Type 601-1
R14	RESISTOR, Fixed, comp, 4700Ω ±10%, 1/4W	200-0472	01121	CB4721
R15	Same as R14			
R16	RESISTOR, Variable, 4700Ω ±20%, 1/2W	40878-1472	08294	Type 3359W
R17	RESISTOR, Fixed, comp, 220Ω ±10%, 1/4W	200-0221	01121	CB2211
	CHASSIS ASSEMBLY A8 (P/O 41710)			
C1	CAPACITOR, Fixed, electrolytic, 1000 μF - 10 +75% 40 Vdc (Not used in all units)	35133-0102	56289	Type 601D
CR1	(Not used)			
CR2	SEMICONDUCTOR DEVICE, Diode	35095-0500	13327	SOD100H
CR3	Same as CR2			
CR4	Same as CR2			
F1	FUSE, Instrument, 1.5A	36968-1500	75915	27501.5
J1	CONNECTOR, Receptacle, electrical, consisting of:			
	1 Connector body	35860-0126	81312	MRAC26P
	20 Contacts, electrical	35861-2120	81312	100-2020P
	4 Contacts, electrical	35861-2118	81312	100-2018P
	1 Contact, electrical	35861-2116	81312	100-2016P
J2	(Not used)			
J3	CONNECTOR, Receptacle, electrical	36255	74868	46825
J4	CONNECTOR, Receptacle, electrical	35102	95712	9950-6
J5	CONNECTOR, Receptacle, electrical	37947		
J6	(Not used)			
J7	CONNECTOR, Plug, electrical (not used in all units)	40237	74868	31-317
K1	RELAY ASSEMBLY, Coaxial	36392		
K2	RELAY, 4 POT, 24 Vdc	36360-0028	77342	MH80650
P1	CONNECTOR, Plug, electrical	36175	74868	Type 27843
P2	CONNECTOR, Plug, electrical, consisting of:			
	1 Connector body	36185-0005	02660	Type 223
	5 Contacts, electrical	35817-1002	02660	220-S02
P3	Same as P 1			
P4	CONNECTOR, Plug, electrical	36174	74868	Type 27-841
P5	CONNECTOR, Plug, electrical consisting of:			
	1 Connector body	36185-0009	02660	Type 223
	9 Contacts, electrical	35817-1002	02660	220-S02
P6	CONNECTOR, Plug, electrical (not used in all units)	40236	74868	69475

Reference Designation	Description	Part Number	Manufacturer & Part No.	
CHASSIS ASSEMBLY A8 (P/O 41710) (Continued)				
Q1	TRANSISTOR	36370-8055	79089	2N3055
Q2	Same as Q1			
R1	RESISTOR, Fixed, ww 3Ω±5%, 5W(Not used in all units)	36604-9301	44655	Type 995-5B
R2	(Not used)			
R3	RESISTOR, Variable, 100Ω, ±20%, 1/2W	8915-0101	01121	GLU1012-SD3028L
R4	RESISTOR, Fixed, comp, 22Ω ±5%, 1/2W	201-0220	01121	EB2205
R5	RESISTOR, Variable, 500Ω, ±30%, 1/20W	35634-0501	71590	Type 621-1
R6	RESISTOR, Variable, 500Ω ±20%, 1/2W	8915-0501	01121	GLU5012-SD3028L
R7	RESISTOR, Fixed, ww, 10Ω ±5%, 5W	36604-0100	44655	Type 995-5B
VR1	SEMICONDUCTOR DEVICE, Diode, Zener type	36302-1120	12969	UZ5812
Z1	ATTENUATOR, 6dB (Not used in all units)	28842-0006	05627	HFA-50 (6dB)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7-1-	41720-0000	CONTROL UNIT ASSEMBLY, C-831A	1	
-1	37638-0002	. COVER ASSEMBLY	1	
		(ATTACHING PARTS)		
-2	104-0016	. SCREW, Machine, bind. hd, brs, ni pl, No. 4-40 thd by 1/4 in. lg (used in 37250-0000 only)	2	
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-3	41629	. KNOB	2	
		(ATTACHING PARTS)		
-4	324-4008	. SETSCREW, Hex soc dr, cup pt, stl, cal. pl, No. 4-40 thd by 1/8 in. lg	4	
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-5	41612	. KNOB	1	
		(ATTACHING PARTS)		
-6	324-4012	. SETSCREW, Hex soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/16 in. lg.	2	
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-7	41613	. KNOB	1	
		(ATTACHING PARTS)		
-8	324-4012	. SETSCREW, Hex soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/16 in. lg	2	
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-9	-	. (Not used)		
-10	113-0032	. SCREW, Machine, bind. hd. brs, blk oxidized, No. 3-48 thd by 1/2 in. lg (used in 37250-0000 only)	2	
-11	13473	. WASHER, Flat copper, ni pl	2	
-12	41677-0002	. PANEL, Printed	1	
-13	14114-0001	. EMBLEM	1	
		(ATTACHING PARTS)		
-14	8040	. NUT, Hexagon, brs, ni pl, No. 4-40 thd	1	
-15	7730	. WASHER, Spring tension	1	
		---*---		
-16	37637-0001	. PRINTED CIRCUIT ASSEMBLY	1	
		PARTIAL BREAKDOWN FOLLOWS		
-17	36183-0002	. . FILTER, Blue (used in 37250-0000 only)	4	
-18	32971-0003	. . LAMP, Incandescent, clear, 5v, 0.115 amp ±10 percent	4	
-19	27029	. PLATE, Adapter	1	
		(ATTACHING PARTS)		
-20	154-0016	. SCREW, Machine, fh, brs, blk oxidized, No. 4-40 thd by 1/4 in. lg	4	
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-21	41634	. PLATE ASSEMBLY	1	
		(ATTACHING PARTS)		
-22	144-0012	. SCREW, Machine, fh, brs, ni pl, No. 4-40 thd by 3/16 in. lg	4	
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-23	35554-0510	. LIGHT, Indicator, 0.06 amps ±10 percent, 5 Vdc (72765 part no. 6039-000-704 GREEN)	1	
		(ATTACHING PARTS)		
-24	-	. NUT, Hexagon, brs, ni pl, No. 10-32 thd (supplied with 35554 0510)	1	
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-25	26633-0011	. BEARING, Sleeve	2	
-26	-	(Not used)		
-27	-	(Not used)		
-28	-	(Not used)		
-29	30188-0121	. RESISTOR, Fixed, ww, 120 ohms ±5 percent, 3 w (56289 type 242E)	1	
-30	37709	. BRACKET, Stop	1	
		(ATTACHING PARTS)		
-31	502-0010	. SCREW, Assembled washer, brs screw, ni pl, sst lockwasher No. 2-56 by 5/32 in. lg (78189 type SEMS)	1	
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-32	-	(Not used)		
-33	-	(Not used)		
-34	-	(Not used)		
-35	-	(Not used)		
-36	-	(Not used)		
-37	-	(Not used)		
-38	41722-0000	. PLATE, Identification	1	
		(ATTACHING PARTS)		
-39	8956-2010	. SCREW, Tapping, thd forming, stl, blk oxidized, No. 2 by 5/32 in. lg (45722 type Z)	2	
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FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION (1 2 3 4 5 6 7)	UNITS PER ASSY	USABLE ON CODE
7-1-40	41616	. CONTROL UNIT SUBASSEMBLY	1	
-41	35862-0001	. . GUIDE, Socket (81312 type G700)	1	
		(ATTACHING PARTS)		
-42	-	. . NUT, Hexagon, brs, gold pl, No. 4-40 thd (supplied with 35862-0001)	1	
-43	-	. . WASHER, Lock, int tooth, brz, gold pl, No. 4 (supplied with 35862-0001)	1	
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-44	35862-0002	. . GUIDE, Pin (81312 type G700)	1	
		(ATTACHING PARTS)		
-45	-	. . NUT, Hexagon, brs, gold pl, No. 4-40 thd (supplied with 35862-0002)	1	
-46	-	. . WASHER, Lock, int tooth, brz, gold pl, No. 4 (supplied with 35862-0002)	1	
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-47	2544	. . TERMINAL, Lug	2	
-48	35861-2120	. . CONTACT, Electrical (81312 Part No. 100-2020P)	33	
-49	35860-0134	. . BODY, Electrical connector (81312 Part No. MRAC-34 P)	1	
		(ATTACHING PARTS)		
-50	164-0024	. . SCREW, Machine, fil h, brs, ni pl, No. 4-40 thd by 3/8 in. lg	4	
-51	8040	. . NUT, Hexagon, brs, ni pl, No. 4-40 thd	4	
-52	13046	. . WASHER, Flat, brs, cad. 0.114 ID by 0.203 OD by 0.020 in. thk	4	
-53	15155	. . WASHER, Flat, al, 0.120 ID by 0.234 OD by 0.032 in. thk	4	
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-54	29916-0001	. . LOCK, Connector (81312 part no. MRE-V)	1	
-55	8625-9104	. . CAPACITOR, Fixed, ceramic, 0.0010 uF +100 -0 percent, 500 Vdcw	1	
-56	41608	. . BRACKET ASSEMBLY	1	
		(ATTACHING PARTS)		
-57	504-0016	. . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
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-58	28996-0052	. . SPACER	4	
		(ATTACHING PARTS)		
-59	504-0016	. . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
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-60	-	(Not used)		
-61	-	(Not used)		
-62	34410	. . SEMICONDUCTOR DEVICE, Diode (93332 part no. 1N270)	8	
-63	41618	. . SWITCH ASSEMBLY	1	
		(ATTACHING PARTS)		
-64	504-0016	. . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
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-65	-	(Not used)		
-66	-	(Not used)		
-67	-	(Not used)		
-68	-	(Not used)		
-69	32823-0008	. . . SWITCH SECTION, Rotary	1	
		(ATTACHING PARTS)		
-69A	135-0028	. . . SCREW, Machine, rh, brs, black oxide, No. 5-40	2	
-69B	8734	. . . WASHER, Lock, split, brz, ni pl, No. 5	2	
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-70	32849-0008	. . . SPACER	2	
-71	28665-0025	. . . RING, Retaining (79136 part no. 5100-25-MD)	1	
-72	1049	. . . WASHER, Flat, ni silver, 0.257 ID by 0.500 OD by 0.008 in. thk	1	
-73	37737	. . . PLATE ASSEMBLY	1	
		(ATTACHING PARTS)		
-74	504-0016	. . . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	3	
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-75	8141	. . . BALL, Bearing	1	
		(ATTACHING PARTS)		
-76	308-0008	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 8-32 thd by 1/8 in. lg	1	
-77	20348	. . . SPRING, Helical, compression	1	
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FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
7-1-78	37780	. . . SPACER	1	
		(ATTACHING PARTS)		
-79	504-0016	. . . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	1	
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-80	28996-0042	. . . SPACER	2	
		(ATTACHING PARTS)		
-81	504-0016	. . . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg(78189 type SEMS)	2	
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-82	27781	. . . BEARING	1	
-83	6376	. . . WASHER, Flat, CRES, 0.130 ID by 0.219 OD by 0.0062 in. thk	1	
-84	37620	. . . GEAR ASSEMBLY	1	
		(ATTACHING PARTS)		
-85	302-0008	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 2-56 by 1/8 in. lg	1	
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-86	37621	. . . SHAFT	1	
		(ATTACHING PARTS)		
-87	37222-0012	. . . RING, Retaining (79136 part no. 5103-12-MD)	1	
-88	6376	. . . WASHER, Flat, CREW, 0.130 ID by 0.219 OD by 0.0062 in. thk	1	
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-89	27781	. . . BEARING	1	
-90	1640	. . . WASHER, Flat, ni silver, 0.251 ID by 0.437 OD by 0.008 in. thk	2	
-91	29184	. . . GEAR, Spur	1	
		(ATTACHING PARTS)		
-92	303-0012	. . . SETSCREW, Fluted soc dr, cap pt, stl, cad. pl, No. 3-48 thd by 3/16 in. lg	2	
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-93	37623	. . . SHAFT	1	
-94	29794	. . . SPRING, Helical extension	1	
-95	30832	. . . STRAP ASSEMBLY	1	
		(ATTACHING PARTS)		
-96	28665-0012	. . . RING, Retaining (79136 part no. 5100-12-C)	1	
-97	6376	. . . WASHER, Flat, CREW, 0.130 ID by 0.219 OD by 0.0062 in. thk	1	
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-98	37577	. . . CAM ASSEMBLY	1	
		(ATTACHING PARTS)		
-99	304-0012	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/16 in. lg	2	
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-100	1049	. . . WASHER, Flat, ni silver, 0.257 ID by 0.500 OD by 0.008 in. thk	1	
-101	32823-0009	. . . SWITCH SECTION, Rotary	1	
-102	135-0020	. . . SCREW, Machine, rh, brs, blk oxidized, No. 5-40 thd by 5/16 in. lg	2	
-103	8734	. . . WASHER, Lock, split, brz, ni pl, No. 5	2	
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-104	32849-0006	. . . SPACER	2	
-105	37624-0001	. . . SHAFT	1	
		(ATTACHING PARTS)		
-106	28665-0025	. . . RING, Retaining (79136 part no. 5100-25-MD)	1	
-107	1049	. . . WASHER, Flat, ni silver, 0.257 ID by 0.500 OD by 0.008 in. thk	1	
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-108	37622	. . . PLATE ASSEMBLY	1	
-109	28996-0029	. . SPACER	4	
		(ATTACHING PARTS)		
-110	504-0016	. . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
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-111	27790	. . COLLAR	1	
		(ATTACHING PARTS)		
-112	304-0008	. . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl. No. 4-40 thd by 1/8 in. lg	2	
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-113	27781	. . BEARING	1	
-114	37606	. . GEAR, Spur	1	
		(ATTACHING PARTS)		

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
7-1-115	27791-4024	SCREW, Machine, hex hd, sst, No. 4-40 thd by 3/8 in. lg	1	
-116	8040	NUT, Hexagon, brs, ni pl, No. 4-40 thd	1	
-117	8497	WASHER, Lock, int tooth, sst, No. 4	1	
-118	23193	WASHER, Flat, sst, 0.1285 ID by 0.344 OD by 0.003 in. thk	2	
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-119	29002	BEARING	1	
-120	29184	GEAR, Spur	1	
		(ATTACHING PARTS)		
-121	303-0012	SETSCREW, Fluted soc dr, cup pt, stl, cad. cp, No. 3-48 thd by 3/16 in. lg	2	
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-121A	35764-0000	BEARING	1	
-122	37606	GEAR, Spur	1	
		(ATTACHING PARTS)		
-123	27791-4024	SCREW, Machine, hex hd, sst, No. 4-40 thd by 3/8 in. lg	1	
-124	8040	NUT, Hexagon, brs, ni pl, No. 4-40 thd	1	
-125	8497	WASHER, Lock, int tooth, sst, No. 4	1	
-126	23193	WASHER, Flat, sst, 0.125 ID by 0.344 OD by 0.003 in. thk	2	
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-127	29002	BEARING	1	
-128	37169	GEAR, Pinion	1	
		(ATTACHING PARTS)		
-129	302-0006	SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 2-56 thd by 3/32 in. lg	2	
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-130	37736	BEARING	1	
-131	37625-0002	PLATE, Mounting	1	
		(ATTACHING PARTS)		
-132	124-0116	SCREW, Machine, rh, brs, ni pl, No. 4-40 thd by 1-1/4 in. lg	4	
-133	8497	WASHER, Lock, int tooth, sst, No. 4	4	
-134	37613-0059	SPACER	4	
-135	28996-0046	SPACER	4	
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-136	27786-0000	GEAR, Spur	1	
		(ATTACHING PARTS)		
-137	303-0006	SETSCREW, Fluted soc dr, cap pt, stl, cad. pl, No. 3-48 thd by 3/32 in. lg	2	
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-138	27789-0000	GEAR, Helical	2	
		(ATTACHING PARTS)		
-139	303-0006	SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 3-48 thd by 3/32 in. lg	4	
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-140	28995-0208	SHAFT	2	
-141	27781	BEARING	2	
-142	27794	GEAR, Spur	1	
		(ATTACHING PARTS)		
-143	303-0008	SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 3-48 thd by 1/8 in. lg	2	
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-144	34410	SEMICONDUCTOR DEVICE, Diode (93332 part no. 1N270)	8	
-145	37574-0005	SWITCH SECTION, Rotary	1	
		(ATTACHING PARTS)		
-146	135-0028	SCREW, Machine, rh, brs, blk oxidized, No. 5-40 thd by 7/16 in. lg	2	
-147	3889-0000	WASHER, Spring tension	2	
-148	38485-0000	WASHER, Nonmetallic, phenolic, 0.140 ID by 0.250 OD by 0.031 thk (86928 part no. 5620-32-31)	2	
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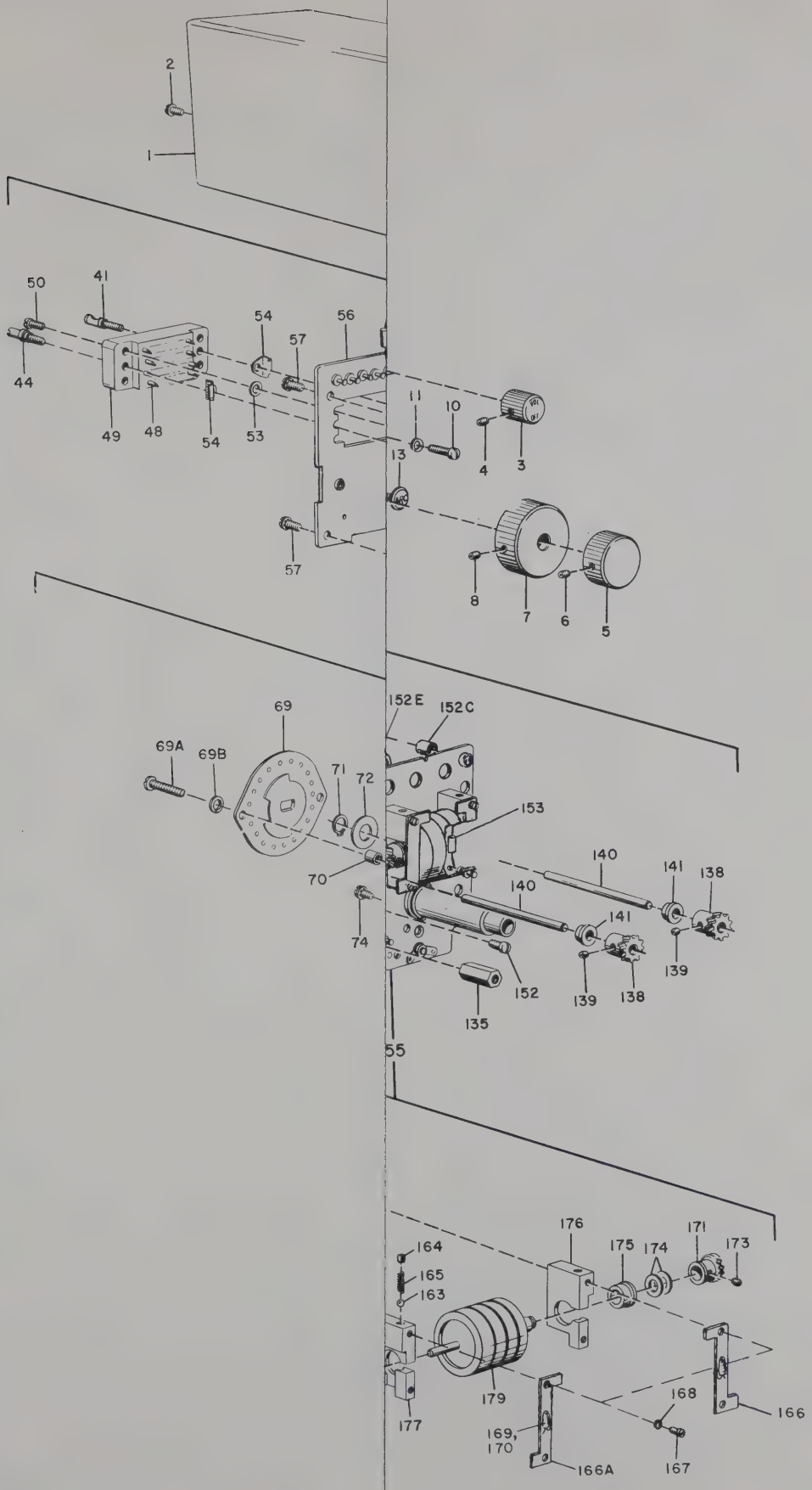
-149	32849-0010	SPACER	2	
-150	37574-0002	SWITCH SECTION, Rotary	1	
-151	33264-0021	SPACER, Threaded end, No. 5-40 int thd one end, No. 6-32 int thd other end	2	
		(ATTACHING PARTS)		
-152	506-0016	SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher No. 6-32 thd by 1/4 in. lg (38189 type SEMS)	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7-1-152A	41611	PLATE	1	
		(ATTACHING PARTS)		
-152B	104-0024	SCREW, Binding hd, No. 4-40 thd	2	
		---*---		
-152C	29609-0008	SPACER	2	
-152D	36309-0006	RESISTOR, Variable, molded, 10kΩ ±10%, 0.25 W, with DPST switch, 1.5 ampere, 28 Vdc, mounted on rear of resistor (01121 type GS)	1	
		(ATTACHING PARTS)		
-152E	-	NUT, Hex (supplied with 36309-0006)	1	
-152F	-	WASHER, Lock (supplied with 36309-0006)	1	
		---*---		
-152G	29152-1502	RESISTOR, Variable, carbon comp, 1kΩ ±20%, 1/2 W	1	
		(ATTACHING PARTS)		
-152H	-	NUT, Hex (supplied with 29152-1502)	1	
-152J	-	WASHER, Lock, int tooth (supplied with 29152-1502)	1	
		---*---		
-153	34410	SEMICONDUCTOR DEVICE, Diode (93332 part no. 1N270)	1	
-154	30188-0151	RESISTOR, Fixed ww, 150Ω ±5%, 3 w (56289 type 242E)	1	
-154A	28448-0102	CAPACITOR, Fixed, ceramic, 1000 pF ±10%, 200 Vdc (72982 type GP4)	2	
-155	41617	PLATE AND COUNTER ASSEMBLY	1	
-156	29794	SPRING, Helical, extension	1	
-157	33165	STRAP ASSEMBLY	1	
		(ATTACHING PARTS)		
-158	28665-0012	RING, Retaining (79136 part no. 5100-12-C)	1	
-159	6376	WASHER, Flat, CRES, 0.130 ID, 0.219OD by 0.0062 in. thk	AR	
		---*---		
-160	37579	CAM ASSEMBLY	1	
-161	304-0008	SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 1/8 in. lg	2	
-162	13110	WASHER, Flat, brz, ni pl, 0.380 ID by 0.562 OD by 0.020 in. thk	1	
		---*---		
-163	8107	BALL, Bearing	2	
		(ATTACHING PARTS)		
-164	304-0006	SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/32 in. lg	2	
-165	33558-0001	SPRING, Helical, compression	2	
		---*---		
-166	40728-0002	PRINTED WIRING ASSEMBLY	1	
-166A	40728-0001	PRINTED WIRING ASSEMBLY	1	
		(ATTACHING PARTS)		
-167	162-0012	SCREW, Machine, fil h, brs, ni pl, No. 2-56 thd by 3/16 in. lg	4	
-168	21966	WASHER, Flat, brs, cad. pl. 0.099 ID by 0.187 OD by 0.020 in. thk	4	
		---*---		
		PARTIAL BREAKDOWN FOLLOWS		
-169	32971-0003	LAMP, Incandescent	2	
-170	36183-0002	FILTER, Lamp	2	
-171	37627	GEAR ASSEMBLY	1	
-172	33637	GEAR ASSEMBLY	1	
		(ATTACHING PARTS)		
-173	302-0004	SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 2-56 thd by 1/16 in. lg	4	
-174	3281	WASHER, Flat, ni silver, 0.251 ID by 0.344 OD by 0.0063 in. lg	AR	
		---*---		
-175	41879	BEARING	2	
-176	34328	BRACKET, Counter	1	
-177	34329	BRACKET, Counter	1	
		(ATTACHING PARTS)		
-178	142-0012	SCREW, Machine, fh, brs, ni pl, No. 2-56 thd by 3/16 in. lg	4	
		---*---		
-179	37547	COUNTER	1	
-180	34351	BRACKET	1	
		(ATTACHING PARTS)		
-181	142-0016	SCREW, Machine, fh, brs, ni pl, No. 2-56 thd by 1/4 in. lg	2	
-182	8275	NUT, Hexagon, brs, ni pl, No. 2-56 thd	2	

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
7-1-183	4052	. . . WASHER, Lock, int tooth, sst, No. 2	2	
-184	34350	. . . SPACER	2	
		---*---		
-185	14699	. . . TERMINAL ASSEMBLY	1	
		(ATTACHING PARTS)		
-186	143-0016	. . . SCREW, Machine, fh, brs, ni pl, No. 3-48 thd by 1/4 in. lg .	1	
-187	4103	. . . WASHER, Lock, int tooth, sst, No. 3	1	
		---*---		
-188	32825-0244	. . . SHAFT	1	
		(ATTACHING PARTS)		
-189	28665-0037	. . . RING, Retaining (79136 type 5100-37-MD)	1	
-190	13110	. . . WASHER, Flat, brs, ni pl, 0.380 ID by 0.562 OD by 0.020 in. thk	1	
		---*---		
-191	41627-0002	. . . PLATE SUBASSEMBLY	1	



Unit, Exploded View

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7-1-183	4052	. . . WASHER, Lock, int tooth, sst, No. 2	2	
-184	34350	. . . SPACER	2	
		---*---		
-185	14699	. . . TERMINAL ASSEMBLY	1	
		(ATTACHING PARTS)		
-186	143-0016	. . . SCREW, Machine, fh, brs, ni pl, No. 3-48 thd by 1/4 in. lg .	1	
-187	4103	. . . WASHER, Lock, int tooth, sst, No. 3	1	
		---*---		
-188	32825-0244	. . . SHAFT	1	
		(ATTACHING PARTS)		
-189	28665-0037	. . . RING, Retaining (79136 type 5100-37-MD)	1	
-190	13110	. . . WASHER, Flat, brs, ni pl, 0.380 ID by 0.562 OD by 0.020 in. thk	1	
		---*---		
-191	41627-0002	. . . PLATE SUBASSEMBLY	1	

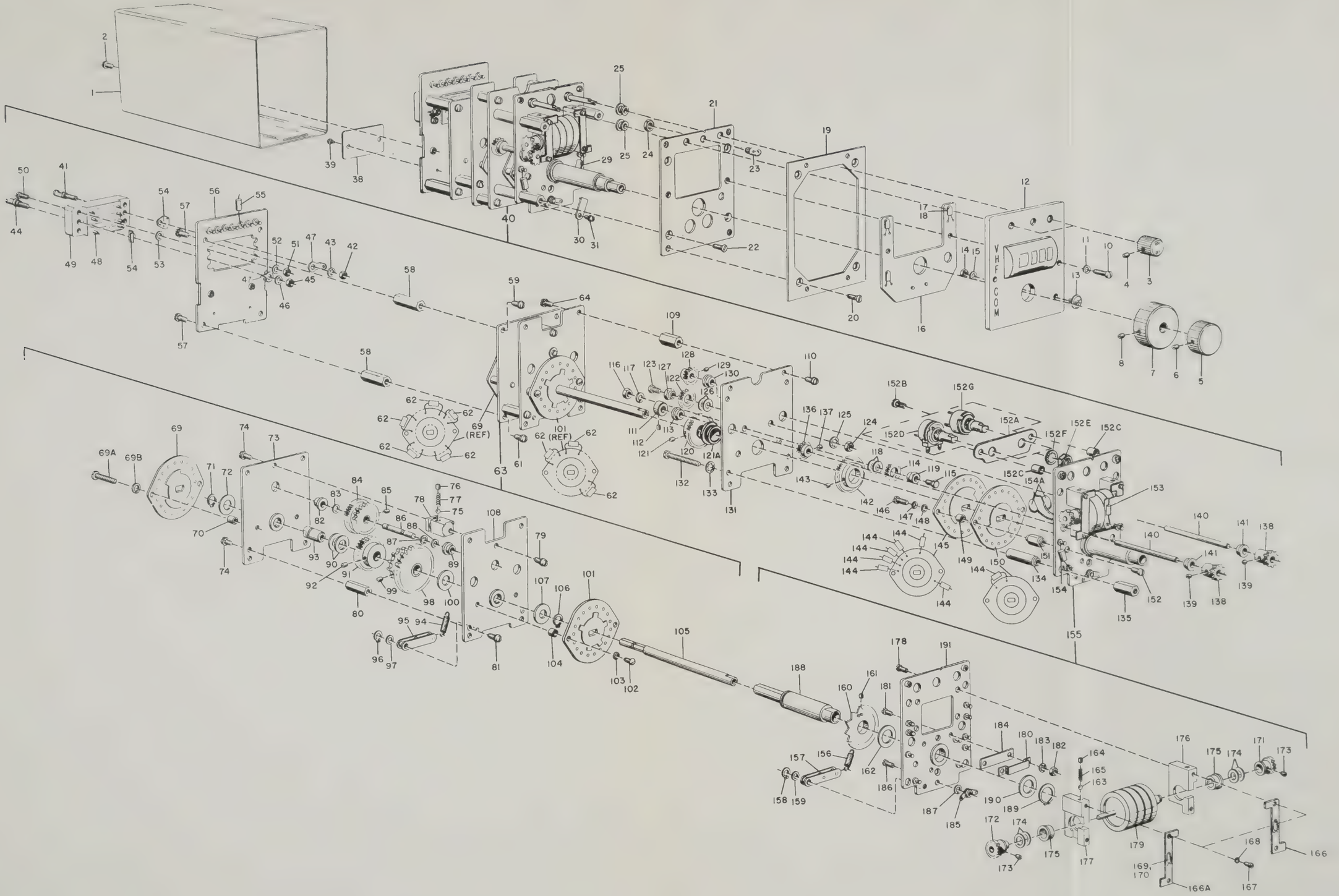


Figure 7-1. C-831A Control Unit, Exploded View

NUMERICAL INDEX

Part No.	Figure 7-1 Index No.
MRAC-34P	49
MRE-V	54
MST-205S	25
Nut, 10-32	24
Nut, 3/8-32	33
Nut, 4-40	42
	45
Washer, Lock, 4	43
	46
1N270	62
	144
	153
100-2020P	48
104-0016	2
104-0024	152B
1049	72
	100
	107
113-0032	10
124-0116	132
13046	52
13110	162
	190
13473	11
135-0020	102
135-0028	69A
	146
142-0012	178
142-0016	181
143-0016	186
144-0012	22
14699	185
15155	53
154-0016	20
162-0012	167
164-0024	50
1640	90
20348	77
21966	168
23193	118
	126
2544	47
26633-0011	25
27029	19
27781	82
	89
	113
	141
27786-0000	136
27789-0000	138
27790	111
27791-4024	115
	123
27794	142
28448-0102	154A
28665-0012	96
	158
28665-0025	71
	106
28665-0037	189
28995-0208	140
28996-0029	109
28996-0042	80
28996-0046	135
28996-0052	58
29002	119
	127
29152-1502	152G
29184	91
	120
29609-0008	152C
29794	94
	156
29916-0001	54
30188-0121	29
30188-0151	154
302-0004	173
302-0006	129
302-0008	85
303-0006	137
	139
303-0008	143
303-0012	92
	121
304-0006	164
304-0008	112
	161
304-0012	99
308-0008	76
30832	95
324-4008	4
324-4012	6
	8
3281	174
32823-0008	69
32823-0009	101
32825-0244	188
32849-0006	104
32849-0008	70
32849-0010	149
32971-0003	18
	169
33165	157
33264-0021	151
33558-0001	165
33637	172

NUMERICAL INDEX

REFERENCE DESIGNATION INDEX

Reference Designation	Figure 7-1 Index No.	Part No.
C1	55	8625-9104
C2	154A	28448-0102
C3	154A	28448-0102
CR1	153	34410
CR2	144	34410
CR3	144	34410
CR4	144	34410
CR5	144	34410
CR6	144	34410
CR7	144	34410
CR8	144	34410
CR9	144	34410
CR10	62	34410
CR11	62	34410
CR12	62	34410
CR13	62	34410
CR14	62	34410
CR15	62	34410
CR16	62	34410
CR17	62	34410
DS1	18	32971-0003
DS2	23	35554-0510
DS3	18	32971-0003
DS4	18	32971-0003
DS5	169	32971-0003
DS6	169	32971-0003
DS7	18	32971-0003
J1	49	35860-0134
R1	154	30188-0151
R2	29	30188-0121
R4	152D	36309-0006
R6	152G	29152-1502
S1A, B	150	37574-0002
S1C	145	37574-0005
S2	145	37574-0005
S3	101	32823-0009
S4	69	32823-0008
S5	152D	36309-0006

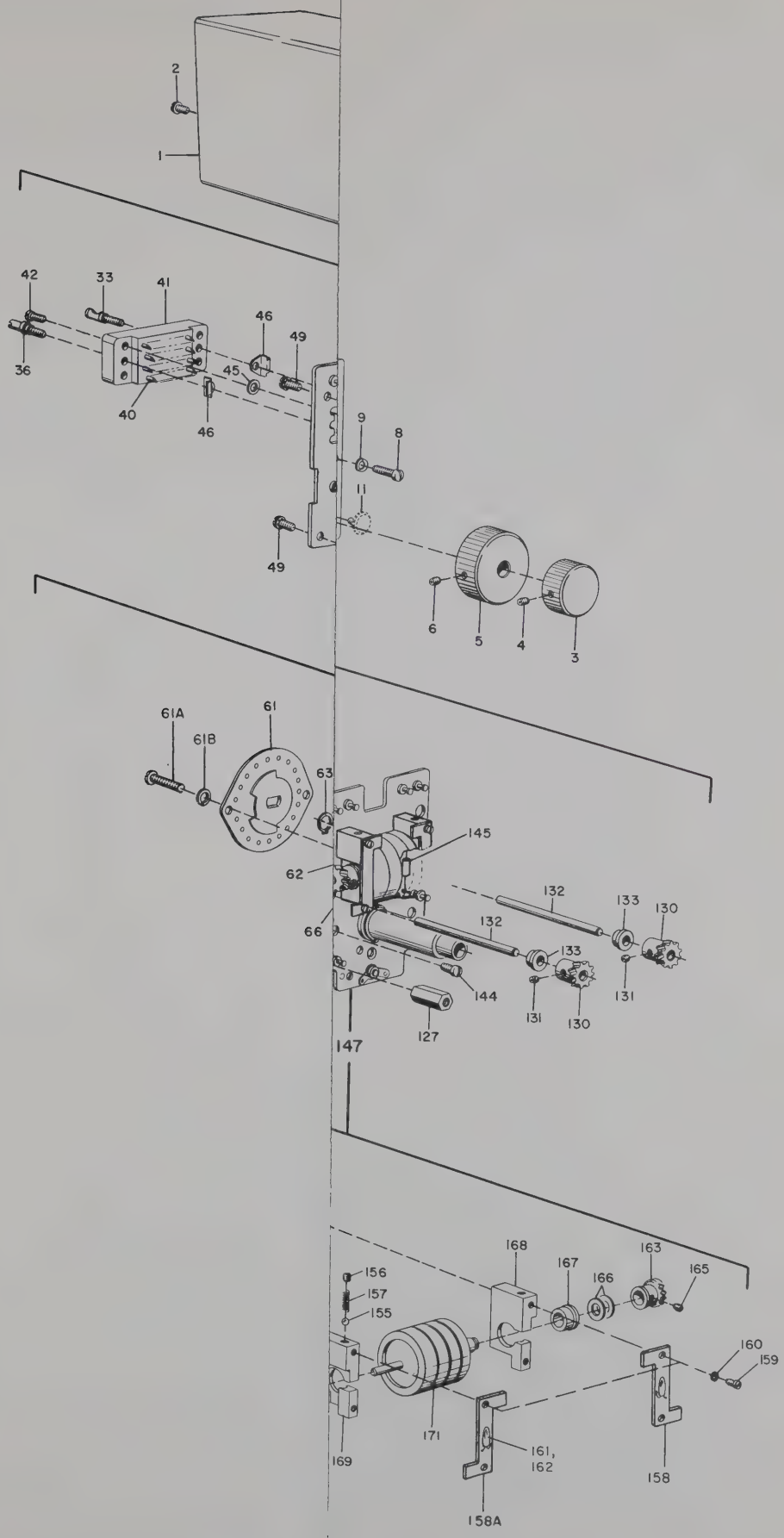
FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7-2-	41910-0000	CONTROL UNIT ASSEMBLY, C-831S	1	
-1	37638-0002	. COVER ASSEMBLY	1	
		(ATTACHING PARTS)		
-2	104-0016	. SCREW, Machine, bind. hd, brs, ni pl, No. 4-40 thd by 1/4 in. lg	2	
		---*---		
-3	41612	. KNOB	1	
		(ATTACHING PARTS)		
-4	304-4012	. SETSCREW, Hex soc dr, cup to, stl. cad. pl, No. 4-40 thd by 3/16 in. lg	2	
		---*---		
-5	41613	. KNOB	1	
		(ATTACHING PARTS)		
-6	304-4012	. SETSCREW, Hex soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/16 in. lg	2	
		---*---		
-7	-	(Not used)		
-8	113-0032	. SCREW, Machine, bind. hd, brs, blk oxidized, No. 3-48 thd by 1/2 in. lg	2	
-9	13473	. WASHER, Spring tension	2	
-10	41677-0003	. PANEL, Printed	1	
-11	14114-0001	. EMBLEM	1	
		(ATTACHING PARTS)		
-12	8040	. NUT, Hexagon, brs, ni pl, No. 4-40 thd	1	
-13	7730	. WASHER, Spring Tension	1	
		---*---		
-14	39413	. PRINTED CIRCUIT ASSEMBLY	1	
		PARTIAL BREAKDOWN FOLLOWS		
-15	36183-0002	. . FILTER, Blue	4	
-16	32971-0003	. . LAMP, Incandescent, clear, 5V, 0.115 A ±10% (71744 part no. 715)	4	
-17	27029	. PLATE, Adapter	1	
		(ATTACHING PARTS)		
-18	154-0016	. SCREW, Machine, fh, brs, blk oxidized, No. 4-40 thd by 1/4 inl lg	4	
		---*---		
-19	37595-0002	. PLATE ASSEMBLY	1	
		(ATTACHING PARTS)		
-20	144-0012	. SCREW, Machine, fh, brs, ni pl, No. 4-40 thd by 3/16 in. lg	4	
		---*---		
-21	35554-0510	. LIGHT, Indicator, 0.06 A ±10%, 5 Vdc (72765 part no. 6039-000-704 GREEN)	1	
		(ATTACHING PARTS)		
-22	-	. NUT, Hexagon, brs, ni pl, No. 10-32 thd (supplied with 35554-0510)	1	
-23	36006-0001	. SWITCH, Toggle, DPDT, 115 V, 5 A (95146 part no. MST-205N)	1	
		(ATTACHING PARTS)		
-24	-	. NUT, Hexagon, brs, ni pl, 1/4-40 thd (supplied with 36006-0001)	2	
-25	-	. WASHER, Lock, int tooth, brz, zi pl, 1/4 in. (supplied with 36006-0001)	1	
-26	-	. WASHER, Key, brs, ni pl, 1/4 in. (supplied with 36006-0001)	1	
		---*---		
-27	342-0680	. RESISTOR, Fixed, comp, 68 ohms ±10%, 1W (01121 part no. GB 6801).	1	
-28	37709	. BRACKET, Stop	1	
		(ATTACHING PARTS)		
-29	502-0010	. SCREW, Assembled washer, brs screw, ni pl, sst lockwasher No. 2-56 by 5/32 in. lg (78189 type SEMS)	1	
		---*---		
-30	41912-0000	. PLATE, Identification	1	
		(ATTACHING PARTS)		
-31	8956-2010	. SCREW, Tapping thd forming, stl, blk oxidized, No. 2 by 5/32 in. lg (45722 type Z)	2	
		---*---		
-32	41639	. CONTROL UNIT SUBASSEMBLY	1	
-33	35862-0001	. . GUIDE, Socket (81312 Type G700)	1	
		(ATTACHING PARTS)		
-34	-	. . NUT, Hexagon, brs, gold pl, No. 4-40 thd (supplied with 35862-0001)	1	
-35	-	. . WASHER, Lock, int tooth, brz, gold pl, No. 4 (supplied with 35862-0001)	1	
		---*---		
-36	35862-0002	. . GUIDE, Pin (81312 type G700)	1	
		(ATTACHING PARTS)		

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
7-2-37	-	NUT, Hexagon, brs, gold pl, No. 4-40 thd (supplied with 35862-0002)	1	
-38	-	WASHER, Lock, int tooth, brz, gold pl, No. 4 (supplied with 35862-0002)	1	
		---*---		
-39	2544	TERMINAL, Lug	2	
-40	35861-2120	CONTACT, Electrical (81312 part no. 100-2020P)	33	
-41	35860-0134	BODY, Electrical connector (81312 part No. MRAC-34 P)	1	
		(ATTACHING PARTS)		
-42	164-0024	SCREW, Machine, fil h, brs, ni pl, No. 4-40 thd by in. lg	4	
-43	8040	NUT, Hexagon, brs, ni pl, No. 4-40 thd	4	
-44	13046	WASHER, Flat, brs, cad. 0.114 ID by 0.203 OD by 0.020 in thk	4	
-45	15155	WASHER, Flat, al, 0.120 ID by 0.234 OD by 0.032 in. thk	4	
		---*---		
-46	29916-0001	LOCK, Connector (81312 part no. MRE-V)	1	
-47	8625-9104	CAPACITOR, Fixed, ceramic, 0.0010 uF +100 -0%, 500 Vdc	1	
-48	41608	BRACKET ASSEMBLY	1	
		(ATTACHING PARTS)		
-49	504-0016	SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
		---*---		
-50	28996-0052	SPACER	4	
		(ATTACHING PARTS)		
-51	504-0016	SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
		---*---		
-52	-	(Not used)		
-53	-	(Not used)		
-54	34410	SEMICONDUCTOR DEVICE, Diode (93332 part no. 1N270)	8	
-55	41618	SWITCH ASSEMBLY	1	
		(ATTACHING PARTS)		
-56	504-0016	SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
		---*---		
-57	-	(Not used)		
-58	-	(Not used)		
-59	-	(Not used)		
-60		(Not used)		
-61	32823-0008	SWITCH SECTION, Rotary	1	
		(ATTACHING PARTS)		
-61A	135-0028	SCREW, Machine, rh, brs, black oxide, No. 5-40	2	
-61B	8734	WASHER, Lock, split, brz ni pl, No. 5	2	
-62	32849-0008	SPACER	2	
-63	28665-0025	RING, Retaining (79136 part no. 5100-25-MD)	1	
-64	1049	WASHER, Flat, ni silver, 0.257 ID by 0.500 OD by 0.008 in. thk	1	
-65	37737	PLATE ASSEMBLY	1	
		(ATTACHING PARTS)		
-66	504-0016	SCREW, Assembled washer, bind. hd. brs screw, ni pl sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS).	3	
		---*---		
-67	8141	BALL, Bearing	1	
		(ATTACHING PARTS)		
-68	308-0008	SETSCREW, Fluted soc dr, cup pt, stl. cad. pl, No. 8-32 thd by 1/8 in. lg	1	
-69	20348	SPRING, Helical, compression	1	
		---*---		
-70	37780	SPACER	1	
		(ATTACHING PARTS)		
-71	504-0016	SCREW, Assembled washer, bind. hd, brs screw, ni pl sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS).	1	
		---*---		
-72	28996-0042	SPACER	2	
		(ATTACHING PARTS)		
-73	504-0016	SCREW, Assembled washer, bind. hd, brs screw, ni pl sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7-2-74	27781	. . . BEARING	1	
-75	6376	. . . WASHER, Flat, CRES, 0.130, ID by 0.219 OD by 0.0062 in. thk	1	
-76	37620	. . . GEAR ASSEMBLY	1	
		(ATTACHING PARTS)		
-77	302-0008	. . . SETSCREW, Fluted soc dr, cup pt, stl. cad. pl, No. 2-56 thd by 1/8 in. lg	1	
		---*---		
-78	37621	. . . SHAFT	1	
		(ATTACHING PARTS)		
-79	37222-0012	. . . RING, Retaining (79136 part no. 5103-12-MD)	1	
-80	6376	. . . WASHER, Flat, CRES, 0.130 ID by 0.219 by 0.0062 in. thk	1	
		---*---		
-81	27781	. . . BEARING	1	
-82	1640	. . . WASHER, Flat, ni silver, 0.251 ID by 0.437 OD by 0.0008 in. thk	2	
-83	29184	. . . GEAR, Spur	1	
		(ATTACHING PARTS)		
-84	303-0012	. . . SETSCREW, Fluted soc dr, cap pt, stl, cad. pl, No. 3-48 thd by 3/16 in. lg	2	
		---*---		
-85	37623	. . . SHAFT	1	
86	29794	. . . SPRING, Helical extension	1	
-87	30832	. . . STRAP ASSEMBLY	1	
88	28665-0012	. . . RING, Retaining (79136 part no. 5100-12-C)	1	
-89	6376	. . . WASHER, Flat, CRES, 0.130 ID by 0.219 OD by 0.0062 in. thk	1	
		---*---		
-90	37577	. . . CAM ASSEMBLY	1	
		(ATTACHING PARTS)		
-91	304-0012	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/16 in. lg		
		---*---		
-92	1049	. . . WASHER, Flat, ni silver, 0.257 ID by 0.500 OD by 0.008 in. thk	1	
-93	32823-0009	. . . SWITCH SECTION, Rotary	1	
		(ATTACHING PARTS)		
-94	135-0020	. . . SCREW, Machine, rh, brs, blk oxidized, No. 540 thd by 5/16 in. lg	2	
-95	8734	. . . WASHER, Lock, split, brs, ni pl, No. 5	2	
		---*---		
-96	32849-0006	. . . SPACER	2	
-97	37624-0001	. . . SHAFT	1	
		(ATTACHING PARTS)		
-98	28665-0025	. . . RING, Retaining (79136 part no. 5100-25-MD)	1	
-99	1049	. . . WASHER, Flat, ni silver, 0.257 ID by 0.500 OD by 0.0008 in. thk	1	
		---*---		
-100	37622	. . . PLATE ASSEMBLY	1	
-101	28996-0029	. . SPACER	4	
		(ATTACHING PARTS)		
-102	504-0016	. . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg (78189 type SEMS)	4	
		---*---		
-103	27790	. . COLLAR	1	
		(ATTACHING PARTS)		
-104	304-0008	. . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 1/8 in. lg	2	
		---*---		
-105	27781	. . BEARING	1	
-106	37606	. . BEAR, Spur	1	
		(ATTACHING PARTS)		
-107	27791-4024	. . SCREW, Machine, hex hd, sst, No. 4-40 thd by 3/8 in. lg	1	
-108	8040	. . NUT, Hexagon, brs, ni pl, No. 4-40 thd	1	
-109	8497	. . WASHER, Lock split, sst, No. 4	1	
-110	23193	. . WASHER, Flat, sst, 0.1285 ID by 0.344 OD by 0.003 in. thk	2	
		---*---		
-111	29002	. . BEARING	1	
-112	29184	. . GEAR, Spur	1	
		(ATTACHING PARTS)		
-113	303-0012	. . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl. No. 3-48 thd by 3/16 in. lg		
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION (1 2 3 4 5 6 7)	UNITS PER ASSY	USABLE ON CODE
7-2-113A	35764-0000	. . BEARING	1	
-114	37606	. . GEAR, Spur	1	
		(ATTACHING PARTS)		
-115	27791-4024	. . SCREW, Machine, hex hd, sst, No. 4-40 thd by 3/8 in. lg	1	
-116	8040	. . NUT, Hexagon, brs, ni pl, No. 4-40 thd	1	
-117	8497	. . WASHER, Lock, int tooth, sst, No. 4	1	
-118	23193	. . WASHER, Flat, sst, 0.125 ID by 0.344 OD by 0.003 in. thk	2	
		---*---		
-119	29002	. . BEARING	1	
-120	37169	. . GEAR, Pinion	1	
		(ATTACHING PARTS)		
-121	302-0006	. . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 2-56 thd by 3/32 in. lg	2	
-122	37736	. . BEARING	1	
-123	37625-0002	. . PLATE, Mounting	1	
		(ATTACHING PARTS)		
-124	124-0116	. . SCREW, Machine, rh, brs, ni pl, No. 4-40 thd by 1-1/4 in. lg	4	
-125	8497	. . WASHER, Lock, int tooth, sst, No. 4	4	
-126	37613-0059	. . SPACER	4	
-127	28996-0046	. . SPACER	4	
		---*---		
-128	27786-0000	. . GEAR, Spur	1	
		(ATTACHING PARTS)		
-129	303-0006	. . SETSCREW, Fluted soc dr, cap pt, stl, cad. pl, No. 3-48 thd by 3/32 in. lg	2	
		---*---		
-130	27789-0000	. . GEAR, Helical	2	
		(ATTACHING PARTS)		
-131	303-0006	. . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 3-48 thd by 3/32 in. lg	4	
		---*---		
-132	28995-0208	. . SHAFT	2	
-133	27781	. . BEARING	2	
-134	27794	. . GEAR, Spur	1	
		(ATTACHING PARTS)		
-135	303-0008	. . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 3-48 thd by 1/8 in. lg	2	
		---*---		
-136	34410	. . SEMICONDUCTOR DEVICE, Diode (93332 part no. 1N270)	8	
-137	37574-0005	. . SWITCH SECTION, Rotary	1	
		(ATTACHING PARTS)		
-138	135-0028	. . SCREW, Machine, rh, brs, blk oxidized, No. 5-40 thd by 7/16 in. lg	2	
-139	3889-0000	. . WASHER, Spring tension	2	
-140	38485-0000	. . WASHER, Nonmetallic, phenolic, 0.140 ID by 0.250 OD by 0.031 in. thk (86928 part no. 5620-32-31)	2	
-141	32849-0010	. . SPACER	2	
-142	37574-0002	. . SWITCH SECTION, Rotary	1	
-143	33264-0021	. . SPACER, Threaded end, No. 5-40 int thd one end, No. 6-32 int thd other end	2	
		(ATTACHING PARTS)		
-144	506-0016	. . SCREW, Assembled washer, bind. hd, brs screw, ni pl, sst lockwasher, No. 6-32 thd by 1/4 in. lg (78189 type SEMS)	2	
		---*---		
-145	34410	. . SEMICONDUCTOR DEVICE, Diode (93332 part no. 1N270)	1	
-146	30188-0151	. . RESISTOR, Fixed ww, 150 ohms ±5%, 3W (56289 type 242E)	1	
-147	41617	. . PLATE AND COUNTER ASSEMBLY	1	
-148	29794	. . . SPRING, Helical, extension	1	
-149	33165	. . . STRAP ASSEMBLY	1	
		(ATTACHING PARTS)		
-150	28665-0012	. . . RING, Retaining (79136 part no. 5100-12-C)	1	
-151	6376	. . . WASHER, Flat, CRES, 0.130 ID, 0.219 OD by 0.0062 in. lg	AR	
		---*---		
-152	37579	. . . CAM ASSEMBLY	1	
		(ATTACHING PARTS)		
-153	304-0008	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 1/8 in. lg	2	
-154	13110	. . . WASHER, Flat, brz, ni pl, 0.380 ID by 0.562 OD by 0.020 in. thk	2	
		---*---		

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
7-2-155	8107	. . . BALL, Bearing	2	
		(ATTACHING PARTS)		
-156	304-0006	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl, No. 4-40 thd by 3/32 in. lg	2	
-157	33558-0001	. . . SPRING, Helical, compression	2	
		---*---		
-158	40728-0002	. . . PRINTED WIRING ASSEMBLY	1	
-158A	40728-0001	. . . PRINTED WIRING ASSEMBLY	1	
		(ATTACHING PARTS)		
-159	162-0012	. . . SCREW, Machine, fil h, brs, ni pl, No. 2-56 thd by 3/16 in. lg	4	
-160	21966	. . . WASHER, Flat, brs, cad, pl, 0.099 ID by 0.187 OD by 0.020 in. thk	4	
		---*---		
		PARTIAL BREAKDOWN FOLLOWS		
-161	32971-0003	. . . . LAMP, Incandescent	2	
-162	36183-0002	. . . . FILTER, Lamp	2	
-163	37627	. . . GEAR ASSEMBLY	1	
-164	33637	. . . GEAR ASSEMBLY	1	
		(ATTACHING PARTS)		
-165	302-0004	. . . SETSCREW, Fluted soc dr, cup pt, stl, cad. pl No. 2-56 thd by 1/16 in. lg	4	
-166	3281	. . . WASHER, Flat, ni silver, 0.251 ID by 0.344 OD by 0.0063 in. lg	AR	
		---*---		
-167	41879	. . . BEARING	2	
-168	34328	. . . BRACKET, Counter	1	
-169	34329	. . . BRACKET, Counter	1	
		(ATTACHING PARTS)		
-170	142-0012	. . . SCREW, Machine, fh, brs, ni pl, No. 2-56 thd by 3/16 in. lg	4	
		---*---		
171	37547	. . . COUNTER	1	
-172	34351	. . . BRACKET	1	
		(ATTACHING PARTS)		
-173	142-0016	. . . SCREW, Machine, fh, brs, ni pl, No. 2-56 thd by 1/4 in. lg	2	
-174	8275	. . . NUT, Hexagon, brs, ni pl, No. 2-56 thd	2	
-175	4052	. . . WASHER, Lock, int tooth, sst, No. 2	2	
-176	34350	. . . SPACER	2	
		---*---		
-177	14699	. . . TERMINAL ASSEMBLY	1	
		(ATTACHING PARTS)		
-178	143-0016	. . . SCREW, Machine, fh, brs, ni pl, No. 3-48 thd by 1/4 in. lg	1	
-179	4103	. . . WASHER, Lock, int tooth, sst, No. 3	1	
		---*---		
-180	32825-0244	. . . SHAFT	1	
		(ATTACHING PARTS)		
-181	28665-0037	. . . RING, Retaining (79136 part no. 5100-37-MD)	1	
-182	13110	. . . WASHER, Flat, brs, ni pl, 0.380 ID by 0.562 OD by 0.020 in. thk	1	
		---*---		
-183	41627-0002	. . . PLATE SUBASSEMBLY	1	



t, Exploded View

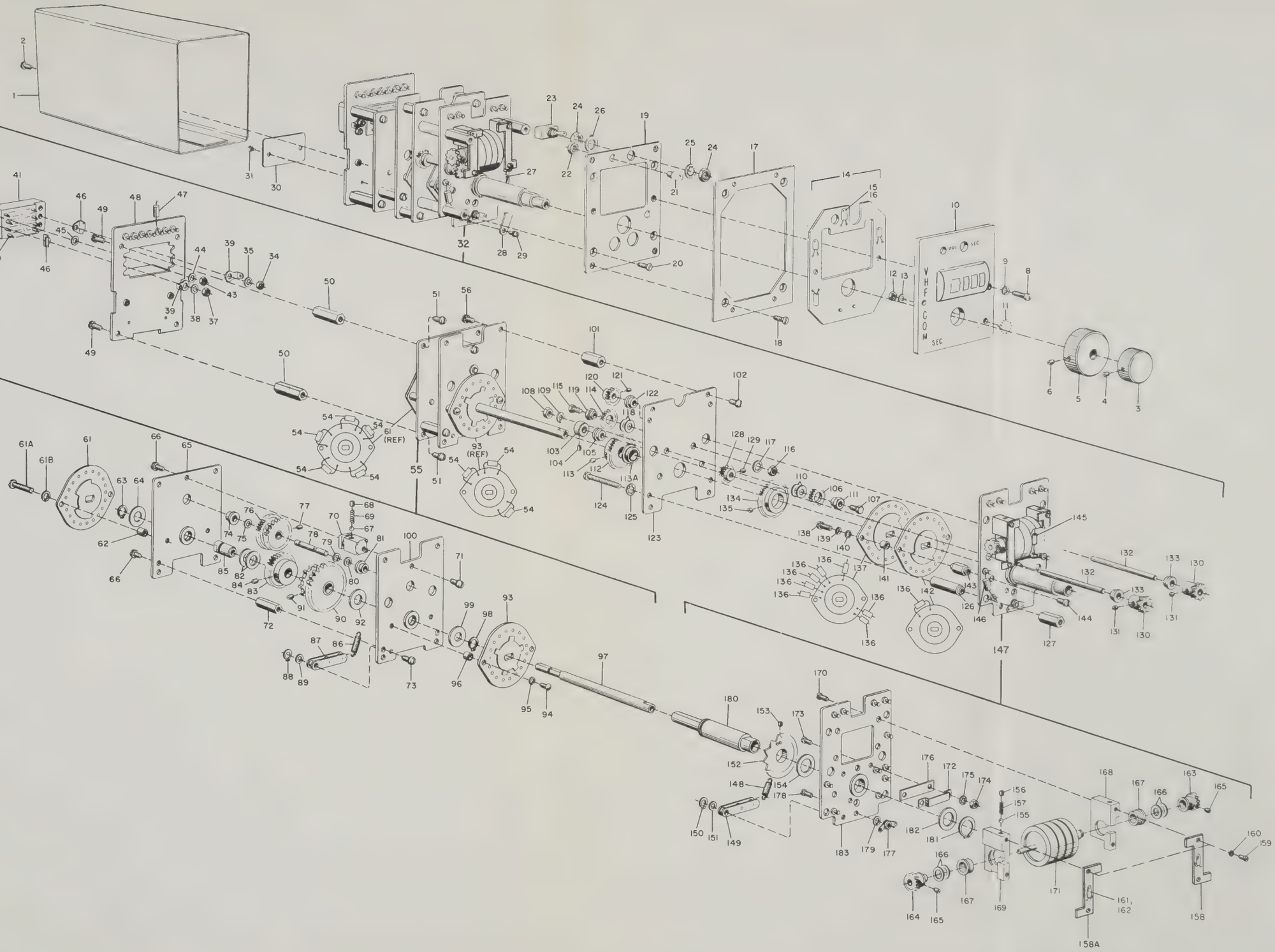


Figure 7-2. C-831S Control Unit, Exploded View

NUMERICAL INDEX

Part No.	Figure 7-2 Index No.
GB6801	27
MRAC034P	41
MRE-V	46
MST-205N	23
Nut, 1/4-40	24
Nut, 10-32	22
Nut, 4-40	34
	37
Washer, Key, 1/4	26
Washer, Lock, 1/4	25
Washer, Lock, 4	35
	38
1N270	54
	136
	145
100-2020P	40
104-0016	2
1049	64
	92
	99
113-0032	8
124-0116	124
13046	44
13110	154
	182
13473	9
135-0020	94
135-0028	61A
	138
142-0012	170
142-0016	173
143-0016	178
144-0012	20
14114-0001	11
14699	177
15155	45
154-0016	18
162-0012	159
164-0024	42
1640	82
20348	69
21966	160
23193	110
	118
2544	39
27029	17
27781	74
	81
	105
	133
27786-0000	128
27789-0000	130
27790	103
27791-4024	107
	115
27794	134
28665-0012	88
	150

Part No.	Figure 7-2 Index No.
28665-0025	63
	98
28665-0037	181
28995-0208	132
28996-0029	101
28996-0042	72
28996-0046	127
28996-0052	50
29002	111
	119
29184	83
	112
29794	86
	148
29916-0001	46
30188-0151	146
302-0004	165
302-0006	121
302-0008	77
303-0006	129
	131
303-0008	135
303-0012	84
	113
304-0006	156
304-0008	104
	153
304-0012	91
304-4012	4
	6
308-0008	68
30832	87
3281-0000	166
32823-0008	61
32823-0009	93
32825-0244	180
32849-0006	96
32849-0008	
	62
32849-0010	141
32971-0003	16
	161
33165	149
33264-0021	143
33558-0001	157
33637	164
342-0680	27
34328	168
34329	169
34350	176
34351	172
34410	54
	136
	145
35554-0510	21
35764-0000	113A
35860-0134	41
35861-2120	40

NUMERICAL INDEX

Part No.	Figure 7-2 Index No.
35862-0001	33
35862-0002	36
36006-0001	23
36183-0002	15
	162
37169	120
37222-0012	79
37547	171
37574-0002	142
37574-0005	137
37577	90
37579	152
37595-0002	19
37606	106
	114
37613-0059	126
37620	76
37621	78
37622	100
37623	85
37624-0001	97
37625-0002	123
37627	163
37638-0002	1
37709	28
37736	122
37737	65
37780	70
38485-0000	140
3889-0000	139
39413	14
4025	175
40728-0001	158A
40728-0002	158
4103	179
41608	48
41612	3
41613	5
41617	147
41618	55
41627-0002	183
41639	32
41677-0003	10
41879	167
41912-0000	30
502-0010	29
504-0016	49
	51
	56
	66
	71
	73
	102
506-0016	144
5100-12-C	88
	150
5100-25-MD	63
	98
5100-37-MD	181
5103-12-MD	79
6376	75
	80
	89
	151
715	16
7730	13
8040	12
	43
	108
	116
8107	155
8141	67
8275	174
8497	109
	117
	125
8625-9104	47
8734	61B
	95
8956-2010	31

REFERENCE DESIGNATION INDEX

Reference Designation	Figure 7-2 Index No.	Part No.
C1	47	8625-9104
CR1	145	34410
CR2	136	34410
CR3	136	34410
CR4	136	34410
CR5	136	34410
CR6	136	34410
CR7	136	34410
CR8	136	34410
CR9	136	34410
CR10	54	34410
CR11	54	34410
CR12	54	34410
CR13	54	34410
CR14	54	34410
CR15	54	34410
CR16	54	34410
CR17	54	34410
DS1	16	32971-0003
DS2	16	32971-0003
DS3	16	32971-0003
DS4	16	32971-0003
DS5	161	32971-0003
DS6	161	32971-0003
DS7	21	35554-0510
J1	41	35860-0134
R1	146	30188-0151
R2	27	342-0680
S1A, B	142	37574-0002
S1C	137	37574-0005
S2	137	37574-0005
S3	93	32823-0009
S4	61	32823-0008
S5	23	36006-0001

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